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German Battleships of World War Two in action

Warships Number 23

Don Greer

squadron/signal publications

German Battleships of World War Two in action

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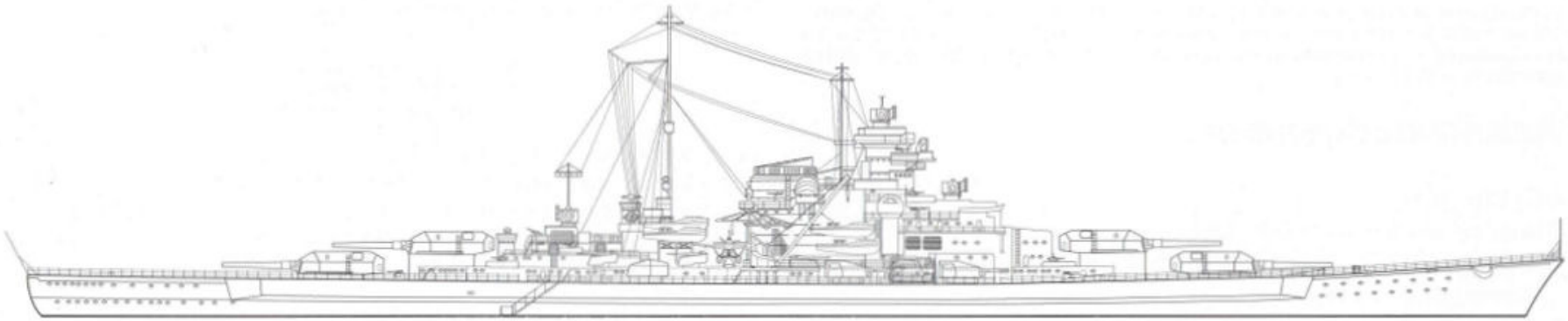

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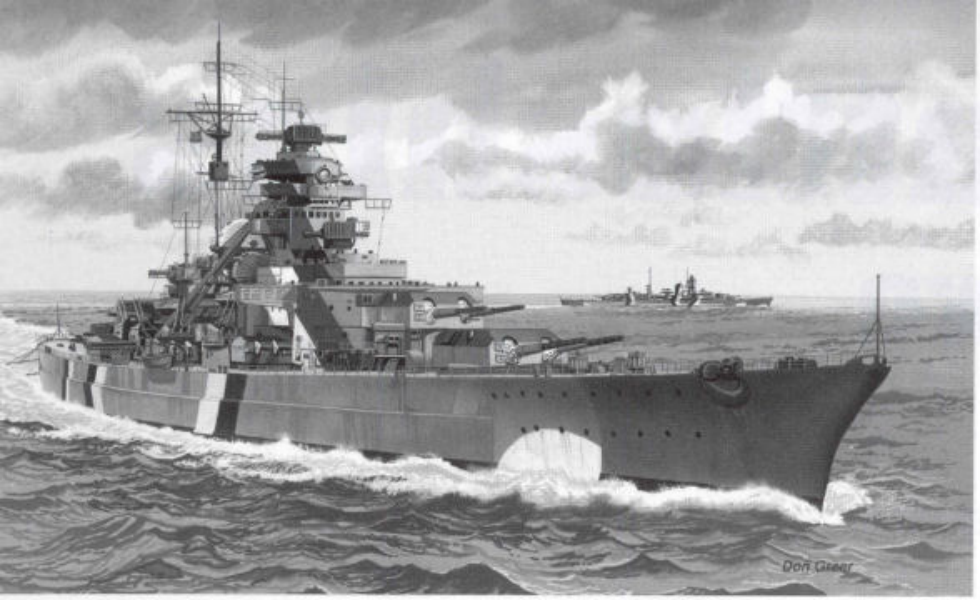

BISMARCK works up in the Baltic Sea in the early Spring of 1941. She is finished in the *Kriegsmarine*'s standard Baltic scheme, which included a Dark Gray bow and stern, Black and White bands, and *Deckfarbe Rot* (Deck Color Red) main turret roofs. The turret roof color has been disputed, with some sources stating that they were Dark Gray. The heavy cruiser PRINZ EUGEN steams in the background. Both BISMARCK and PRINZ EUGEN were repainted before they entered the North Atlantic on Operation RHEINÜBUNG (RHINE EXERCISE) in May of 1941.

Acknowledgements

Bob Cressman
Bundesarchiv, Koblenz, Germany
Etablissement de Conception et de Production Audiovisuelle des Armees (ECPA), Paris
Ken Macpherson
National Archives and Records Service (NARS), Washington
Naval Historical Center (NHC), Washington

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ISBN 0-89747-482-1

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BISMARCK fires on the British battlecruiser HMS HOOD and battleship HMS PRINCE OF WALES during their brief firefight in the Denmark Strait on 24 May 1941. This view was taken from the ADMIRAL HIPPER Class heavy cruiser PRINZ EUGEN, which accompanied BISMARCK on Operation RHEINÜBUNG. BISMARCK sank HOOD and forced PRINCE OF WALES out of action, but one of PRINCE OF WALES' shells struck BISMARCK's lower hull forward. This damage directly led to her loss three days later.

Introduction

The German Navy (*Kriegsmarine*) was the smallest of the three main *Wehrmacht* (Armed Forces) branches with which Germany went to war in 1939. The German *Heer* (Army) was the most powerful land force ever assembled, at least until the end of 1943. The *Luftwaffe* was a large, modern, and highly effective air force. They and the Army's *Panzer* (Armor) formations had driven the British off the European continent and forced the French into a humiliating surrender in six weeks during the Spring of 1940. By any estimation, these forces were among the finest in the world. On the other hand, the *Kriegsmarine*, was – at least on paper – not in the same class as the world's great navies. The Americans, British, and Japanese all had larger, more powerful navies. The *Kriegsmarine* rested uncomfortably in the second rank along with the French and Italian navies.

This situation resulted from several historical and cultural factors.

- The navy Imperial Germany built prior to and during World War One was a formidable force, which forced the British into crippling expenditures to maintain its primacy at sea. With Germany's defeat in 1918, the victorious Allies had no intention of allowing the Germans to again build a navy capable of challenging Britain's command of the sea. Germany was forced to surrender all its modern warships and was left with a rump fleet consisting of a few old battleships and cruisers, and little else.
- German *Führer* (Leader) Adolf Hitler, who made all major decisions on military spending, was an Austrian by birth. Austria – to an even greater extent than Germany – was historically a continental power that naturally saw land warfare as the ultimate expression of military strength. Unconfirmed stories circulated that Hitler was prone to seasickness. What is known is that he never spent more than a few hours aboard any of his warships.
- The Nazi party, which Hitler led and embodied, had as its twin doctrinal tenets anti-Semitism and anti-Communism. In 1933, the Nazis rose to power in part because of their repeated condemnation of the Socialist and Communist politicians. These parties led the movement that weakened the position of the *de facto* military rulers, Erich Ludendorff and Paul von Hindenburg, and ultimately brought down *Kaiser* (Emperor) Wilhelm II in November of 1918. The *Kaiserliche Marine* (Imperial Navy) was a major supporter of those left-wing politicians. The High Seas Fleet became increasingly restive after Jutland[1] as it languished in port, unable to take on Britain's Royal Navy (RN) head-to-head. This fleet came out in open mutiny when ordered on a final, desperate sortie against the British Grand Fleet in late October of 1918. From Hitler's point of view, the navy would always be tainted by association with the 'November Criminals' who engineered Imperial Germany's surrender.
- The Nazis quickly purged the post-World War One *Reichsmarine*[2] of any officers with the slightest suspicion of leftist leanings. They even changed the name of the fleet to *Kriegsmarine* in 1935 to be sure that everyone knew this was a new beginning for the German Navy. Nevertheless, the fleet was the least 'Nazified' of the *Wehrmacht*'s branches of service. The German Army had always been highly conservative and they quickly and easily accepted Nazi ideology. The SS (*Schutzstaffel*; Defense Squadron) began as personal bodyguards for Hitler and other Nazi leaders, only later evolving into a large-scale military organization. The *Luftwaffe* was organized under the command of World War One ace and ardent Nazi Hermann Göring and was from the beginning a politically 'pure' service. Only the fleet looked back with nostalgia to an earlier time, before the Nazis, when it was a world-class naval force. Alone among the services, it didn't adopt the Nazi salute, retaining the traditional hand-to-cap military salute.

These developments left Germany with a second-rate navy in the early 1930s, but it also planted the seeds for the creation of a larger fleet. The resulting fleet occupied the attention of the Allies, particularly the British, far beyond what its actual strength deserved. It forced the *Kriegsmarine* to think long and hard about the ships it would build. It was obvious that Germany would never be able to compete with its potential enemies in any kind of traditional naval warfare. The *Kriegsmarine* leadership knew that they would always have just a few capital ships, never enough to contemplate a second Jutland.

This new *Kriegsmarine* faced the same strategic problem that had hobbled the *Kaiserliche Marine* in World War One: Germany has no easy ocean access. Its great port cities (Wilhelmshaven, Bremen, Hamburg, and Kiel) are either on the North Sea or the Baltic Sea. Great Britain sits astride all routes to the Atlantic Ocean. Getting to the open ocean means passing through the English Channel or one of the narrows separating Scotland from Norway. This challenge was daunting enough in World War One, but was now made far more difficult by the emergence of aircraft for reconnaissance and attack over open water.

Whatever ships the *Kriegsmarine* opted to build, they would have to possess an exceptional set of characteristics. Those ships would have to be versatile, capable of playing multiple roles, and unusually self-sufficient to be useful. Since it was obvious there would be no large-scale naval actions, these ships would have to be

[1]The British and German fleets clashed at the Battle of Jutland (called Skagerrak by the Germans) off Denmark on 31 May and 1 June 1916.

[2]The German Navy was named the *Kaiserliche Marine* until 1 January 1921, when it was renamed the *Reichsmarine*. This service became the *Kriegsmarine* on 21 May 1935.

Germany was allowed only a few old pre-Dreadnought battleships and some smaller units after her defeat in World War One and the Versailles Treaty. This force was barely adequate for coastal defense and little else. The newest of these old battleships was SCHLESWIG-HOLSTEIN, which was launched in 1906 and modernized in the 1920s. The two most noticeable modifications were merging her two forward funnels into one larger funnel and replacing her foremast with a shorter, tubular structure that supported a director top. (NARS)

designed to operate effectively alone or with, at the most, one or two other ships.

At least at the beginning of the Nazi era, all this would have to be done within the confines of treaties that Hitler was not yet ready to repudiate. These treaties strictly limited the tonnage and armament of *Kriegsmarine* ships. Up until World War Two, indeed up until the Japanese attack on Pearl Harbor on 7 December 1941, a navy's worth was defined by the number and quality of big gun capital ships in a fleet. From this point of view – to which *Kriegsmarine* leadership also subscribed – Germany's new fleet would have no chance of challenging the Royal Navy, although it was also greatly diminished since the end of World War One by the disposal of many war-construction ships and the global depression of the 1930s.

Given this reality, the roles any new capital ships could play were limited. In selecting a role (or roles) for these ships, the *Kriegsmarine* would also be influencing the design characteristics of these warships, as each role demanded a ship that emphasized certain characteristics and downplayed the importance of others. Among the relevant choices were:

- Coastal defense – This name implies that ships designed for this role are intended to protect a nation's coastline from the close approach of enemy warships. This role can be achieved by relatively small ships, which have no need for high speed, long range, or great seaworthiness. A shallow draught allowing movement close to shore is often an advantage. They can carry a small number of main guns, but those must be of a large caliber, capable of rapidly inflicting damage sufficient to cripple or drive off any attacker. There were two schools of thought regarding armor. One held that armor should be kept to a minimum in order to achieve the smallest possible displacement. If such a ship were lost, it would sink in shallow water and be easily salvageable. The other theory held that armor should be maximized to allow survival in an extended siege.
- Commerce raider – Ships designed for this role require speed, seaworthiness, and range, which made them the opposites of coastal defense ships. A commerce raider is likely to be chased by enemy cruisers; therefore, its armament and armor should be superior to ships of that type. The assumption is that a commerce raider would be able to outrun any enemy capital ship.
- Fleet-in-being – This was the strategy forced on the Germans in World War One by their numerical inferiority to the British. The Germans had been building large numbers of Dreadnoughts[3], each better in fighting qualities then their Royal Navy equivalents, but never exceeded two-thirds the number the British possessed. This is the classic definition of a fleet-in-being, a fleet that poses a strategic problem for the enemy simply by its existence. A fleet-in-being represents a threat because it forces enemies to always operate at strength; the fleet-in-being is capable of defeating sections of the enemy fleet in detail should the opportunity arise. Thus, the ships appropriate to a fleet-in-being should be at least equivalent to the expected enemy's capital ships. In the early 1930s, that meant ships of approximately 35,000 tons[4] displacement, capable of approximately 25 knots[5] speed, armed with main guns of between 14 inches (35.6 CM) and 16 inches (40.6 CM), and protected against guns of the same range of calibers.

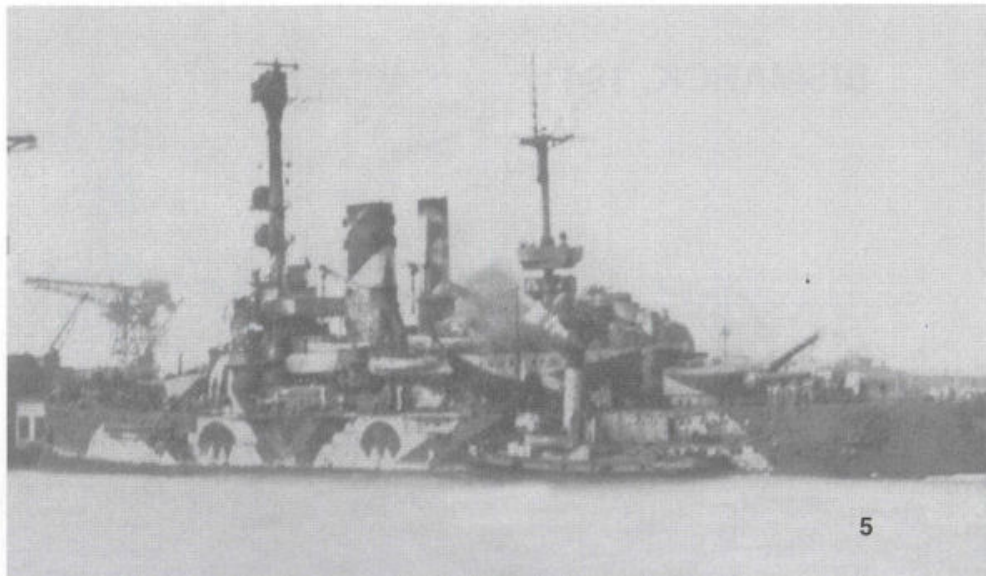
On top of these strategic considerations was the additional constraint put on Germany by the Versailles Treaty[6] and subsequent naval agreements. The treaties allowed Germany to begin replacing its obsolete battleships with new ones when the old hulls reached 20 years of age. Beyond that, it required that any replacement ships not exceed 10,000 tons standard displacement and that any main battery larger than 28 CM (11 inches) had to be specifically approved by the Treaty powers. In order to appreciate the limitations these requirements put on naval designers, it is necessary to understand that on any given displacement, the specification of a design in terms of the three main characteristics of a warship (armament, protection, and propulsion) is a zero-sum game. This means that on a given displacement, any increase of one characteristic requires a decrease in one or both of the others. Even increasing displacement doesn't necessarily solve all problems, because increasing the hull's size means more armor to protect it and more power to move it at the same speed.

Deciding between all these options led to significant indecision on the part of *Kriegsmarine* leadership. Eventually, this led to the construction of ships that met the requirements at least in part of each of the possible strategic types. The Germans designed and built three classes of capital ships before and during World War Two. They were:

- **DEUTSCHLAND Class** – After much equivocation, this class ended up with some of the characteristics of a coast defense ship and some of those of a commerce raider. Due to exceptional endurance, these vessels had some success as commerce raiders.
- **SCHARNHORST Class** – These ships were really pure commerce raiders of an improved DEUTSCHLAND design, with the speed to outrun anything stronger and the firepower and protection to outfight anything smaller.
- **BISMARCK Class** – Fast battleships comparable to any of their contemporaries. They were more than a match for the Royal Navy's KING GEORGE V class.

All the effort that went into the design and all the resources that went into the construction of these ships were effectively rendered futile by the final emergence of airpower as the primary instrument of naval force. The Japanese attack on Pearl Harbor and even more so the subsequent sinking of HMS REPULSE and PRINCE OF WALES off the coast of Malaya on 10 December 1941 rendered all conventionally-armed capital ships effectively obsolete. It is all the more ironic then that PRINCE OF WALES was the same ship that fired the shot that led directly to BISMARCK's loss.

SCHLESWIG-HOLSTEIN fired the first shots of the war at Danzig (now Gdansk, Poland) and some of the last, supporting retreating German troops along the Baltic Sea shore. In between, she served as a training ship based at Gotenhafen (now Gdynia, Poland) and was occasionally pressed into service as an icebreaker when the Baltic froze over. The colors of SCHLESWIG-HOLSTEIN's camouflage in 1940 are unknown, but it is believed to be White, Gray, Green, and Brown. These colors are known to have been used on other *Kriegsmarine* ships that operated along the Baltic coast.



[3]Dreadnoughts were battleships with an all-big gun armament. They were named for the first such warship, HMS DREADNOUGHT, which was commissioned into the Royal Navy in late 1906.

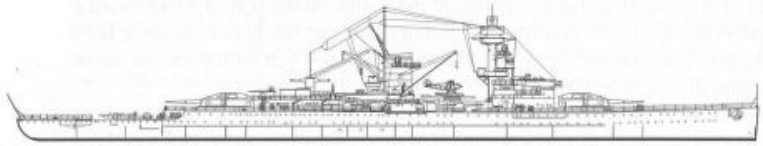
[4]A ton in this book is the long ton of 2240 pounds (1016 KG).

[5]One knot is equivalent to 1.2 MPH (1.9 KMH).

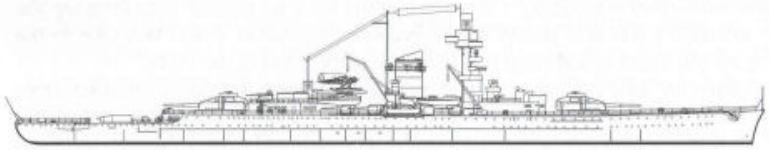
[6]Germany and the Allied Powers signed the Treaty of Versailles formally ending World War One on 28 June 1919. The principal Allies were France, Great Britain, Italy, and the United States.

Development

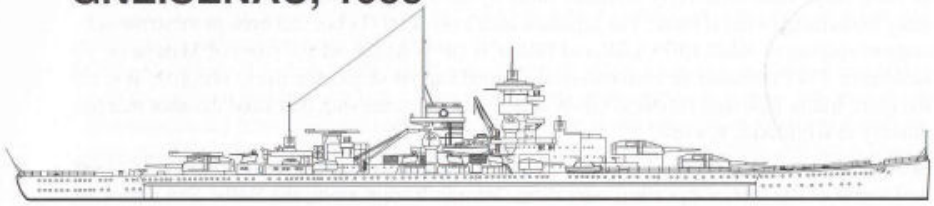
DEUTSCHLAND, 1938



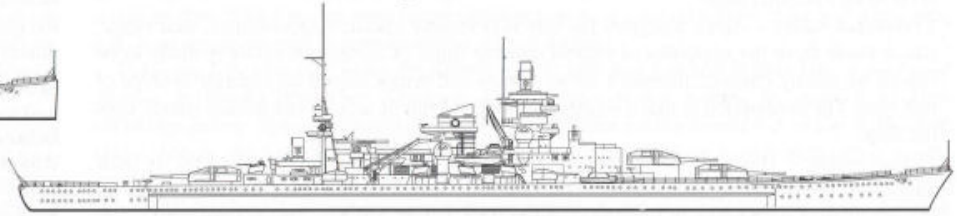
ADMIRAL SCHEER, 1944



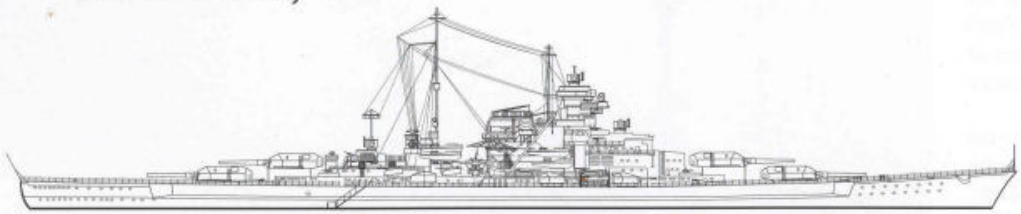
GNEISENAU, 1938



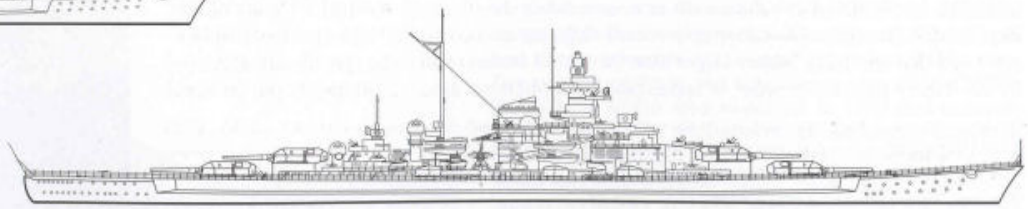
SCHARNHORST, 1943



BISMARCK, 1941



TIRPITZ, 1944



DEUTSCHLAND Class

The Versailles Treaty limited the post-World War One German Navy to eight obsolete pre-Dreadnought battleships and a small number of cruisers and smaller units. This treaty allowed replacement of these old battleships when they reached 20 years of age. The specifications of the allowed replacement vessels were only vaguely laid out in that accord. The only firm requirement was that the standard displacement couldn't exceed 10,000 tons. Beyond that, any design that exceeded certain limits had to be submitted for approval by the Allied navies. The main gun caliber limit beyond which approval was required was 28 CM (11 inches) and the *Reichsmarine* leadership was quite certain that larger guns would not be approved.

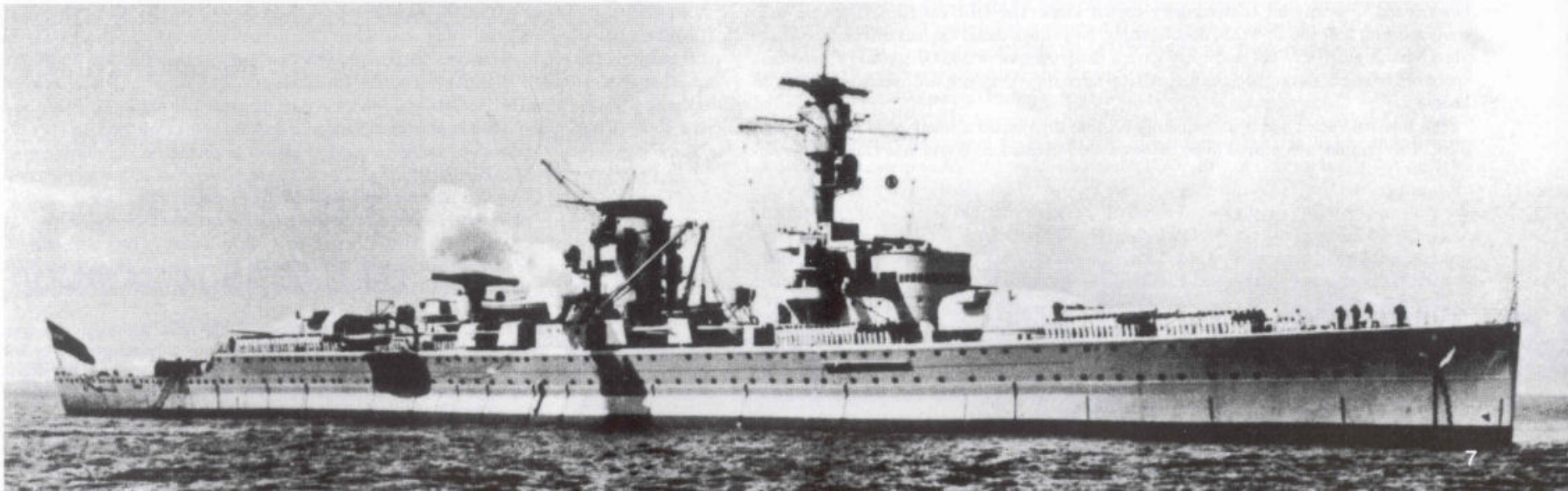
Within these vague guidelines, it was obvious that any design would have to give up many desirable characteristics. It took the Germans a long time to decide the type of ship they wanted. What was immediately obvious was that these new ships would in no sense be comparable to contemporary battleships. It was impossible to build that kind of power, speed, and protection into a 10,000-ton hull. The problem facing German designers was that if all three of the main characteristics of warships were given equal shares of the displacement, the result would be a ship poorly suited for any possible role. The resulting ship would be outgunned by anything larger than a heavy cruiser, too slow to outrun enemy capital ships, and too weakly protected to take on even smaller units without fear of disabling damage. Improving any one of these characteristics meant giving up something somewhere else.

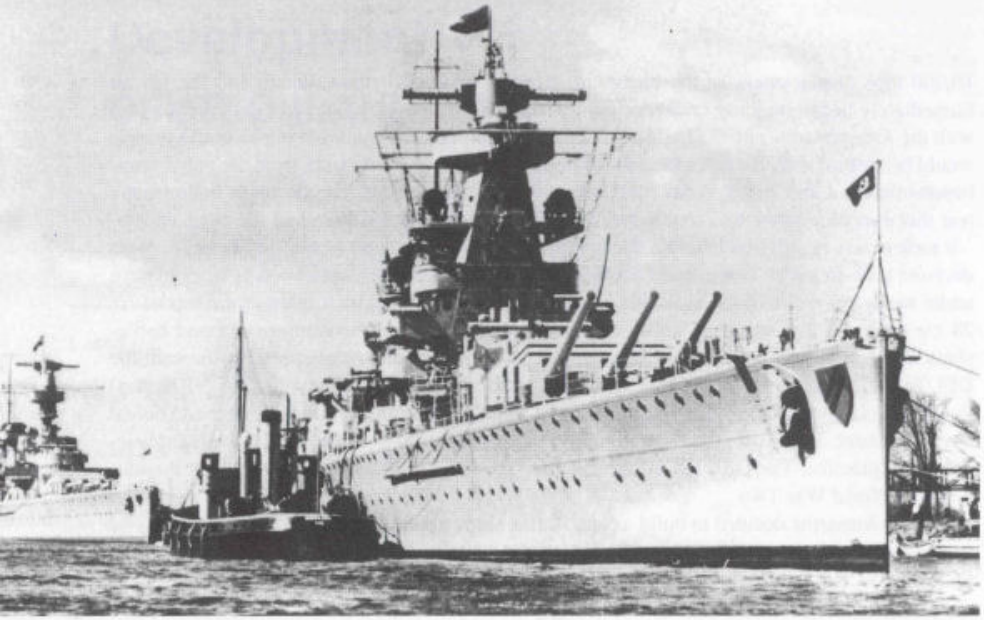
A wide variety of designs were produced ranging from small, slow coast defense monitors with a small number of 28 CM guns to designs that approximated the treaty cruisers being built at that time by the major navies of the world. (The treaty in question is the 1922 Washington Treaty on Naval Armaments that, among other provisions, established 8-inch/20.3 CM guns and 10,000 tons displacement as the maximum size for cruisers. Britain, Japan, and the US all immediately began building cruisers right up to the maximum size.) Neither extreme sat well with the *Kriegsmarine* chiefs, the former because a German Navy without ocean-going vessels would be unthinkable, the latter because to build a navy in which cruisers were the major combatants was to admit defeat at sea even before the next war began. The Germans believed the war that everyone knew was coming would settle the score with Britain and the other Allies.

It took nearly eight years before a decision was reached on exactly which ship to build. (This decision took so long that work on DEUTSCHLAND started two years later than it could have under treaty provisions.) After all this effort, a design emerged with a main armament of six 28 CM guns and a speed of 28 knots, which was faster than most existing or planned battleships. Protection was sacrificed to achieve that level of armament and speed. In the end, the DEUTSCHLANDs were completed with side armor barely 60 to 80MM (2.4 to 3.1 inches) thick. It was hoped that the resulting ship would be able to outrun anything stronger and defeat anything faster. Ironically, this was similar to the battlecruiser concept, which proved unsuccessful in practice. The DEUTSCHLAND Class' thesis was put to the test soon after the outbreak of World War Two.

The *Reichsmarine* decided to build a class of five ships to this design in 1926. The intent was to lay down one per year, starting in 1928, as the permitted replacements for old BRAUNSCHWEIG Class battleships. DEUTSCHLAND, lead ship of the class, was authorized in 1928 and commissioned on 1 April 1933. The onset of the Great Depression slowed the ordering of the second (ADMIRAL SCHEER) and third (ADMIRAL GRAF SPEE) hulls until 1931 and 1932, respectively. SCHEER was commissioned on 12 November 1934 and GRAF SPEE was commissioned on 6 January 1936. The fourth and fifth hulls were ordered in 1934, but before they could be laid down, an entirely new design was adopted and they became the two SCHARNHORST Class battleships.

DEUTSCHLAND's crew mans the rails three days after her commissioning into the *Reichsmarine* on 4 April 1933. She was long, fast, and impressive-looking with her two large 28 CM (11-inch) triple turrets. It was easy to overlook the weak protection that made DEUTSCHLAND and her sisters vulnerable in any gunfight. She was not fitted with a catapult for aircraft operations until 1935. (Via Ken Macpherson)





ADMIRAL SCHEER (foreground) and DEUTSCHLAND display the (from front) red-white-black turret bands while in port. These bands identified German warships on the Spanish Neutrality Patrol during the Spanish Civil War. Britain, France, and Germany voluntarily patrolled Spain's coast to prevent contraband arms shipment to either side. Germany's sector was the Mediterranean coast, where large arms shipments from Fascist Italy managed to slip through to Francisco Franco's fascist Nationalist forces. This was a case of the fox guarding the henhouse. (Via Ken Macpherson)

One other characteristic of this class that was of considerable interest was the choice of powerplant. The Germans decided to fit these ships with diesel engines rather than the steam turbines found in nearly all contemporary capital ships. The DEUTSCHLANDs were each equipped with four sets of MAN double-acting, two-stroke diesel engines driving two shafts via a Vulcan gearbox. This machinery gave a design output of 54,000 SHP and a maximum speed of 26 knots. (During acceptance trials, all three ships demonstrated speeds exceeding 28 knots.)

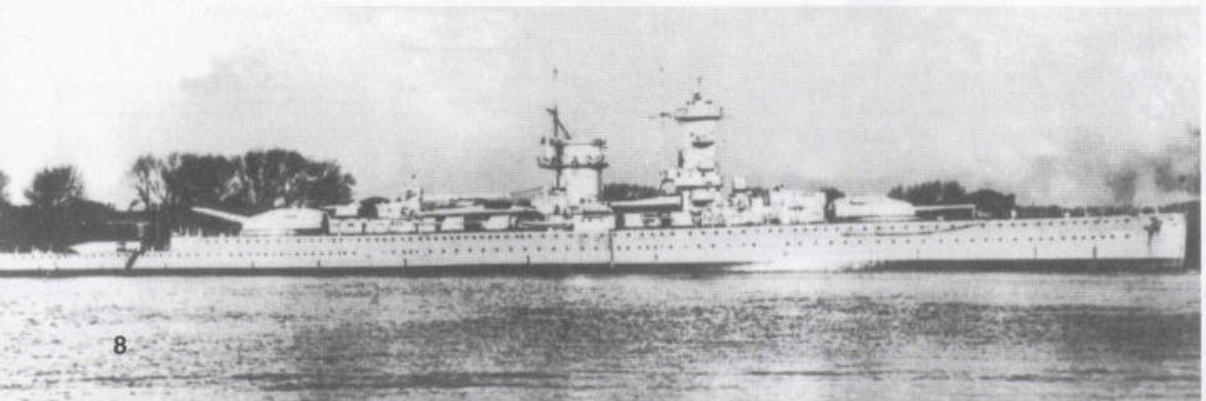
This unusual choice was made primarily because it promised a smaller and lighter powerplant. This presumption proved to be based on old information. World War One-vintage turbines were large and heavy, but design and manufacture advances in the 1920s resulted in smaller, higher-pressure turbines. These would have been both lighter and more compact for the same power than the diesels employed in the DEUTSCHLANDs. On the plus side, the diesels had the great advantage of availability at short notice. (Steam turbines can take hours to go from powered-down to full-speed; diesels can do the same in minutes.) Diesels also had several inherent problems, including their lower reliability compared to turbines. They had the additional disadvantage of producing a constant vibration, which made life aboard these ships extremely unpleasant. The diesel's disadvantages were such that when the third ship of the class, ADMIRAL GRAF SPEE, was authorized to a slightly modified design (with somewhat thicker and more extensive armor), serious consideration was given to replacing the diesels with turbines. In the end, she was completed with diesels similar to her sisters.The major advantage of diesels was the far better fuel economy. The DEUTSCHLANDs had a range of approximately 20,000 nautical miles (NM; 23,030 miles/37,062 KM) without refueling, between two and three times the range of a turbine-powered ship of similar size and speed. Both of those advantages are of great importance for a ship intended for commerce raiding.

These ships as built were approximately ten percent heavier than the treaties allowed, with an actual standard displacement of between 11,000 and 12,000 tons. This remained an open secret until it no longer mattered. None of the Allies complained, partly because all the Allies – with the sole exception of Great Britain – exceeded treaty limits to some extent. The DEUTSCHLANDs' full load displacement during the war was approximately 16,000 tons. DEUTSCHLAND, as launched, was 181.7 M (596 feet 1.5 inches) long at the waterline and 186 M (610 feet 2.8 inches) overall, with a beam of 20.6 M (67 feet 7 inches), a draft of 5.8 M (19 feet 0.3 inches) at standard displacement, and a draft of 7.2 M (23 feet 7.5 inches) at full load. In 'as launched' condition, ADMIRAL SCHEER was broader at 21.3 M (69 feet 10.6 inches) and deeper at full load at 7.3 M (23 feet 11.4 inches). ADMIRAL GRAF SPEE had an even greater beam of 21.6 M (70 feet 10.4 inches) and a greater full load draft of 7.4 M (24 feet 3.3 inches). Both LÜTZOW (as DEUTSCHLAND was renamed on 15 November 1939) and ADMIRAL SCHEER were later fitted with a new, more curved 'clipper' bow, which increased the overall length to 187.9 M (616 feet 5.6 inches).

DEUTSCHLAND and ADMIRAL SCHEER each had 60MM (2.4-inch) thick belt armor; ADMIRAL GRAF SPEE's belt armor was 80MM (3.1 inches) thick. All three ships had an inner bulkhead that ran from the armored deck down to the inner bottom. This was 45MM (1.8 inches) thick on DEUTSCHLAND and 40MM (1.6 inches) thick on her sisters. The armored deck was 40MM thick on DEUTSCHLAND and 45MM on the other two ships. All three ships had a 20MM (0.8-inch) thick bulkhead from the armored deck up to the main deck.

The complements of these ships varied from a low of 619 in peacetime to a maximum of 1340. The latter included prize crews at the start of a wartime commerce raid. These people manned any captured ships.

The DEUTSCHLANDs' main battery consisted of six 28 CM (11-inch) SK C/28 naval rifles. They were mounted in two triple-turrets: one forward and one aft. This gun was a new design dating from 1928 with significantly better performance than the World War One-vintage



ADMIRAL SCHEER joined the fleet in late 1934. Although she was basically the same as DEUTSCHLAND, she differed greatly in her superstructure appearance. ADMIRAL SCHEER's tower foremast was larger and further aft than on her sister, and she was built with aircraft facilities aft of her funnel.

ADMIRAL GRAF SPEE cruises off the German coast soon after her commissioning on 6 January 1936. She was slightly larger and better protected than her two sisters, DEUTSCHLAND and ADMIRAL SCHEER. ADMIRAL GRAF SPEE's superstructure layout was similar to that of ADMIRAL SCHEER. Like her sisters, ADMIRAL GRAF SPEE had a straight stem with little flare, which made them wet forward in any seaway. The shield on her bow near the anchor has the arms of the ship's namesake, Admiral Maximilian, *Graf* (Count) von Spee. He commanded the German East Asia Cruiser Squadron early in World War One. Major German warships traditionally displayed such heraldry on their bows in peacetime.

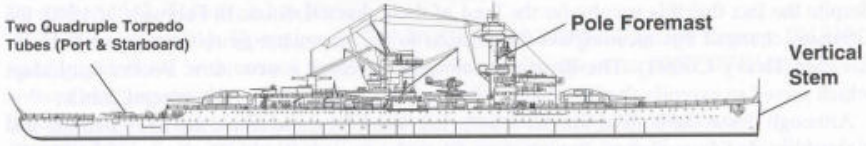
11-inch gun used by many German Dreadnoughts. The barrel was 54.5 calibers long, or 1526 CM (600.8 inches). They fired 315 KG (694.4-pound) shells at 890 M (2920 feet) per second to a maximum range of 23.35 NM (26.9 miles/43.3 KM) at a rate of 2.5 rounds per minute. This extraordinary range was achieved by elevating the barrel at 45°. The secondary battery consisted of eight 15 CM (5.9-inch) SK C/28 guns in shielded single mounts.

DEUTSCHLAND was launched with an Anti-Aircraft (AA) battery of three single 88MM (3.5-inch) SK C/31 guns. This was increased on all three ships over time until it reached a maximum on LÜTZOW. Its ultimate AA battery was six 105MM (4.1-inch) SK C/33 guns in twin mounts, four 37MM *Flak* M43 cannon in double mounts, six 40MM Bofors *Flak* 28 cannon in single mounts, and twenty-six 20MM *Flak* 38 cannon in single, twin, and quadruple mounts. All three ships also carried eight 53.3 CM (21-inch) torpedo tubes in quadruple mounts on the fantail. Each tube was loaded with a standard G7a steam-driven torpedo, which was 7 M (22 feet 11.6 inches) long and weighed 1528 KG (3369 pounds). These could reach a maximum speed of 40 knots, but reached maximum range of 7.7 NM (8.9 miles/14.3 KM) at 30 knots. It carried a 320 KG (705 pound) Hexanite warhead.

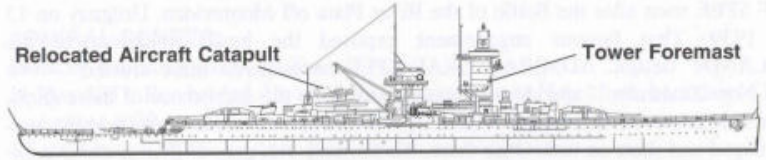
Each DEUTSCHLAND Class ship carried four 10.5 M (34-foot 5.4-inch) optical rangefinders for main battery fire control. One rangefinder each was mounted atop the fore and aft superstructures and one in each of the two main turrets. The quality of German optics was such that these ships were able to find the accurate range and put gunfire on target remarkably fast when weather conditions allowed. The advent of radar rangefinding often put German warships at a disadvantage as World War Two progressed. During the war, the Germans didn't deploy sufficiently accurate naval radars to provide fire control for its capital ships by radar alone. In part this was because the Germans were of the opinion that radars with wavelengths of less than 50 CM were technically impossible in the short term. This opinion was correct in 1939, but both the British and Americans were producing radars with shorter wavelengths and better displays by 1940. By the time the Germans realized their mistake, they were far behind in the technological race.

In 1936, ADMIRAL GRAF SPEE was the first German warship to be fitted with search radar

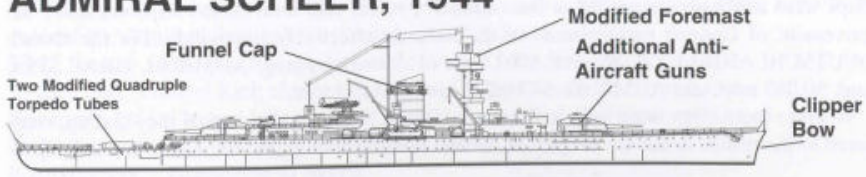
DEUTSCHLAND, 1938



ADMIRAL GRAF SPEE, 1939



ADMIRAL SCHEER, 1944



DEUTSCHLAND cruises off Bilbao, Spain during her first Neutrality Patrol cruise on 5 August 1936. The tri-color recognition stripes across the top and sides of the main turrets have not yet been added. An aircraft catapult was installed between the foremast and funnel in 1935. *Kriegsmarine* battleships had hulls painted *Schiffstarnfarbe* (Ship's Camouflage Color) *31, Dunkelgrau* (Dark Gray) and superstructures in *Schiffstarnfarbe 31, Hellgrau* (Light Gray) prior to World War Two. Steel deck surfaces were *Deckfarbe* (Deck Color) 51 *Dunkelgrau*, while wooden deck areas were left in natural wood. The boot topping along the waterline was *Wasserlinienfarbe* (Waterline Color) *I 23a Grau* (Gray). *Schiffsbodenfarbe* (Ship's Hull Color) *I 22a Rot* (Red) anti-fouling paint was applied below the waterline. (NHC)

when an early experimental version of the FuMO[1] 22 was fitted to the foremast. This radar used a mattress-type antenna about half the size of the standard *Seetakt* (*Seetaktische Geräte*; Sea Tactical Device) antenna. She kept this experimental set until her loss in 1939. Some reports indicate that DEUTSCHLAND was also fitted with an experimental radar as early as 1937, but the earliest confirmed radar installation on this ship was a FuMO 22 set on her foremast in 1939. The FuMO 22 was the most commonly installed German naval radar, a surface search set that operated at an 81.5 CM wavelength and had an effective range of 13 NM (15 miles/24.1 KM). LÜTZOW had the smaller mattress antenna (FuMB[2] *Ant 7 – Timor*) for a *Samos* (FuMB 4) radar detector set, mounted opposite the FuMO 22 antenna on the aft side of her forward main battery rangefinder in January of 1942. This antenna was removed in March of 1944.

When ADMIRAL SCHEER's forward tower mast was modified in 1940, she was fitted with FuMO 27 radar antennas on her fore and aft rangefinders, replacing a single FuMO 22 mounted forward in 1939. The FuMO 27 set was a refined FuMO 22, operating at the same wavelength, but generating a narrower beam that improved its bearing accuracy. The FuMO 27 antenna was only two-thirds the width of the larger FuMO 22 antenna. In 1942, ADMIRAL SCHEER had a *Timor* antenna added to the backside of the forward main battery rangefinder and four small *Sumatra* radar detection antennas added to the top level of her forward superstructure.

When word of the DEUTSCHLANDs reached the British and French navies, the result was consternation. This concern was far beyond that which should have greeted three new, but relatively small and weak capital ships in the navy of their former and future enemy. It was partly because these ships fit no existing category in the minds of French and British admirals. The French rushed into production the two DUNKERQUE Class battleships, which were specifically made faster and better armed than the DEUTSCHLANDs. The British didn't build any new ships specifically with the DEUTSCHLANDs in mind. The subsequent KING GEORGE V Class, like the DUNKERQUEs, were stronger and faster than the DEUTSCHLANDs, but weaker than most contemporary battleships.

The confusion these ships caused can be seen in the fact that no one, not even the Germans, knew exactly what to call them. They were originally called *Panzerschiffe* (Armored Ships) despite the fact that this was by far the least of their characteristics. In February of 1940, the Germans changed this meaningless designation to the somewhat more appropriate *Schwere Kreuzer* (Heavy Cruiser). The British, meanwhile, invented a new term, Pocket Battleship, which served to magnify the importance of these ships in the eyes of the general public.

Although it was difficult to find an appropriate name for these ships, the *Kriegsmarine* had no problem deciding what to do with them when the Second World War began. DEUTSCHLAND and ADMIRAL GRAF SPEE were sent on long commerce raids at the onset of the conflict. Enthusiasm for their employment in this role remained high despite the loss of ADMIRAL GRAF SPEE soon after the Battle of the River Plate off Montevideo, Uruguay on 13 December 1939. That famous engagement exposed the basic weakness of the DEUTSCHLANDs' design. ADMIRAL GRAF SPEE encountered three cruisers – two British, one New Zealander – and she was unable to escape the persistence of these ships, although she held her own. Finally, ADMIRAL GRAF SPEE was forced to put into the neutral port damaged and short on fuel. Once there, the Germans fell prey to British disinformation. Convinced that overwhelming forces awaited her outside the port, the decision was made to scuttle ADMIRAL GRAF SPEE rather than face the enemy. Despite this setback, these ships were relatively successful at the commerce raider role until Allied airpower made the movement of German surface units in the Atlantic effectively impossible. For the record, DEUTSCHLAND/LÜTZOW sank 6962 tons of Allied shipping, ADMIRAL GRAF SPEE sank 50,089 tons, and ADMIRAL SCHEER sank 137,223 tons.

Whether these ships were truly worth the resources in men and materials they tied up, compared to the results achieved, is open to debate. It is interesting, but ultimately futile, to spec-

[1]FuMO: *Funkmess-Ortung*; Radar-Direction Finder, Active Ranging.
[2]FuMB: *Funkmess-Beobachtung*; Radar-Detector, Passive Detection.

ulate how the Battle of the Atlantic would have progressed had the Germans built and manned additional U-boats (*Unterseeboote*; Submarines) before the war began, rather than building these oversized commerce raiders.

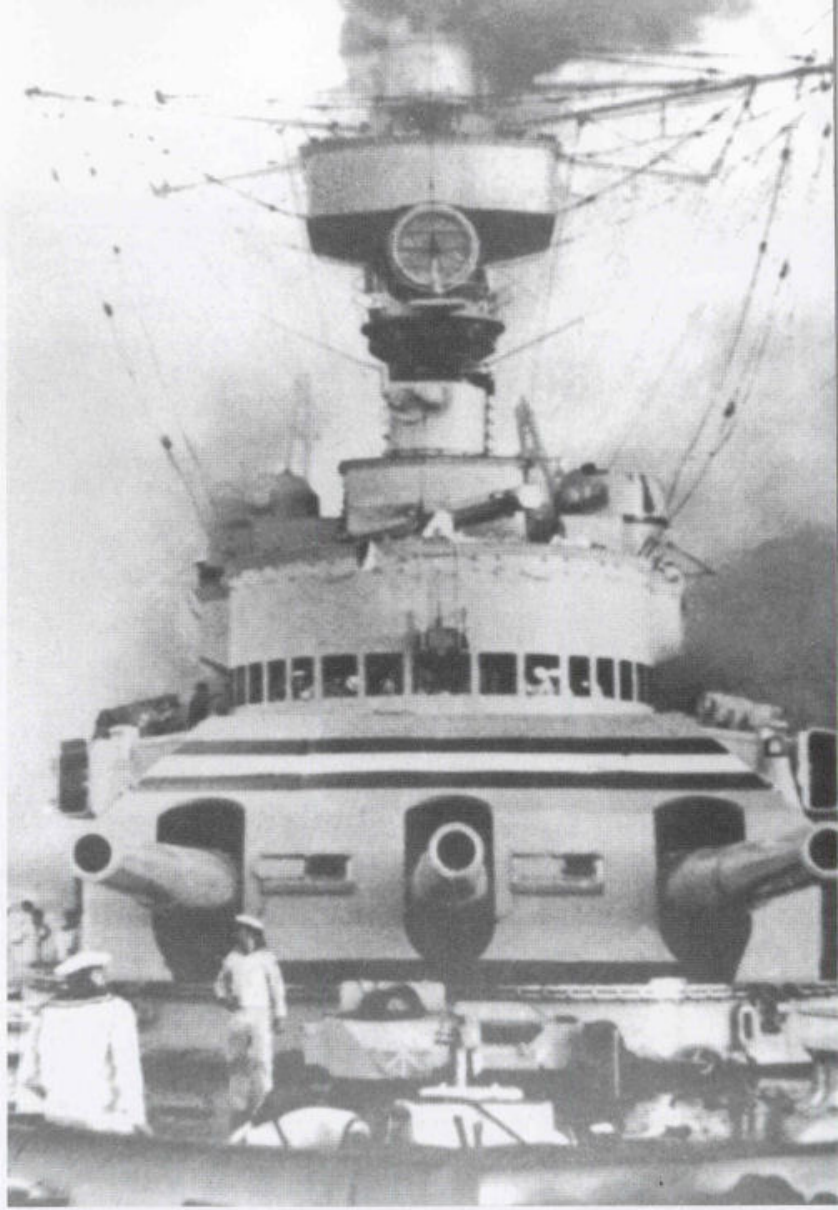
Battle Histories of DEUTSCHLAND Class Ships:

DEUTSCHLAND/LÜTZOW:

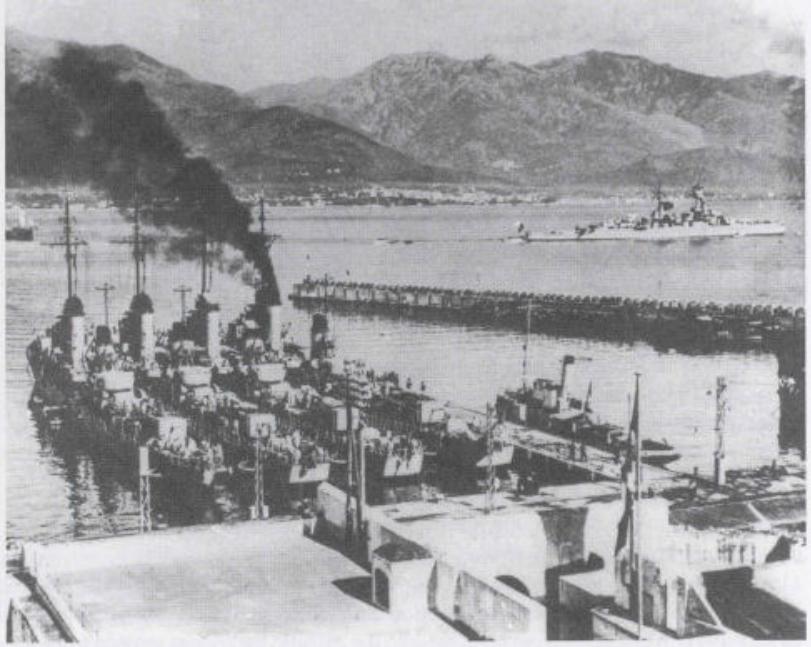
1933-36: Served as fleet flagship.
1936-37: Neutrality Patrol off Spain.
29 May 1937: Damaged by two bombs dropped by Republican bombers near Ibiza.
24 August 1939: Left Wilhelmshaven, Germany for waiting area south of Greenland.
26 September 1939: Released to raid commerce in North Atlantic. On this raid, sank two ships and captured one.
5 November 1939: Recalled to Germany.
15 November 1939: Renamed LÜTZOW.
24-25 November 1939: Unsuccessful raid off Jutland, Denmark.
9 April 1940: Gun battle with Norwegian shore batteries in Oslofjord; hit by three 28 CM shells.
11 April 1940: Hit by one torpedo from British submarine HMS SPEARFISH during return to Germany; severe damage to stern; towed to Kiel; out of action until January 1941.
13 July 1941: While attempting breakout into the Atlantic, hit by one torpedo from RN aircraft; under repair at Kiel, Germany until January of 1942.
May 1942: Transferred to Narvik, Norway.
3 July 1942: Ran aground at start of Operation RÖSSELSPRUNG (HORSE JUMP) against Allied Convoy PQ.17; repaired at Gotenhafen (now Gdynia, Poland).
December 1942: Transferred to Narvik.
30-31 December 1942: Operation REGENBOGEN (RAINBOW) against Convoy JW.51B near Bear Island; running gun battle with convoy escort; serious damage to destroyer HMS OBDURATE; operation called off without sighting merchant ships.
September 1943: Transferred to Gotenhafen to support retreating German forces.
16 April 1945: Sank upright in shallow water off Swinemünde (now Swinoujscie, Poland) by near misses by RAF 6-ton (5.4 MT) bombs; main battery still serviceable & used against advancing Soviet troops.
4 May 1945: Blown up by own crew to prevent capture.

ADMIRAL SCHEER:

1936-38: Neutrality Patrol off Spain.
31 May 1937: Bombarded Almeria, Spain in response to Republican bombing of DEUTSCHLAND.
September 1939: Available for limited service due to engine problems.
4 September 1939: Hit by three RAF bombs; none exploded.
February-September 1940: Complete refit.
23 October 1940: Transferred to Brunsbüttel, Germany, then broke out to the Atlantic.
5 November 1940: Attack on Allied Convoy HX.84; sank auxiliary cruiser HMS JERVIS BAY and six merchant ships; damaged three others; continued raid in South Atlantic.
20-22 January 1941: Reached vicinity of Seychelles Islands in Indian Ocean.
1 April 1941: Entered Kiel; claimed sinking of 17 ships during five month raid.
November 1941: Planned breakout with TIRPITZ cancelled on Hitler's orders.
21-23 February 1942: Transferred to Trondheim.
9-10 May 1942: Transferred to Narvik.



Spanish Republican Tupolev SB bombers attacked DEUTSCHLAND off Ibiza on 29 May 1937. This was in response to what the Republicans saw as the obvious collusion by German ships with the illegal import of arms to the Nationalists. Two bombs hit her amidships, which set off fires. This raid caused extensive damage to DEUTSCHLAND, but it never threatened her seaworthiness. Two days later, ADMIRAL SCHEER responded by shelling the Republican port of Almeria.

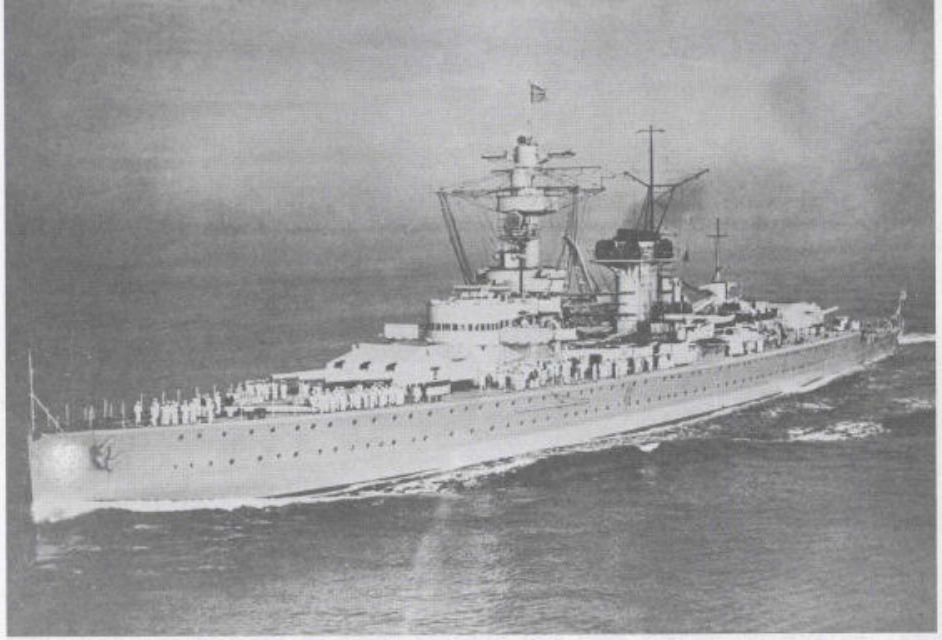


(Above) DEUTSCHLAND is moored in the harbor at Naples, Italy in 1938. Naples was the chief port for German vessels deployed on the Spanish Neutrality Patrol. Four torpedo boats – either Type 1923 or Type 1924 – are moored in the foreground. German torpedo boats were similar in appearance to destroyers, but were smaller and had greater emphasis on torpedoes for their main armament. Tri-color recognition bands are painted on their aft 10.5 CM (4.1-inch) turrets. (NHC)

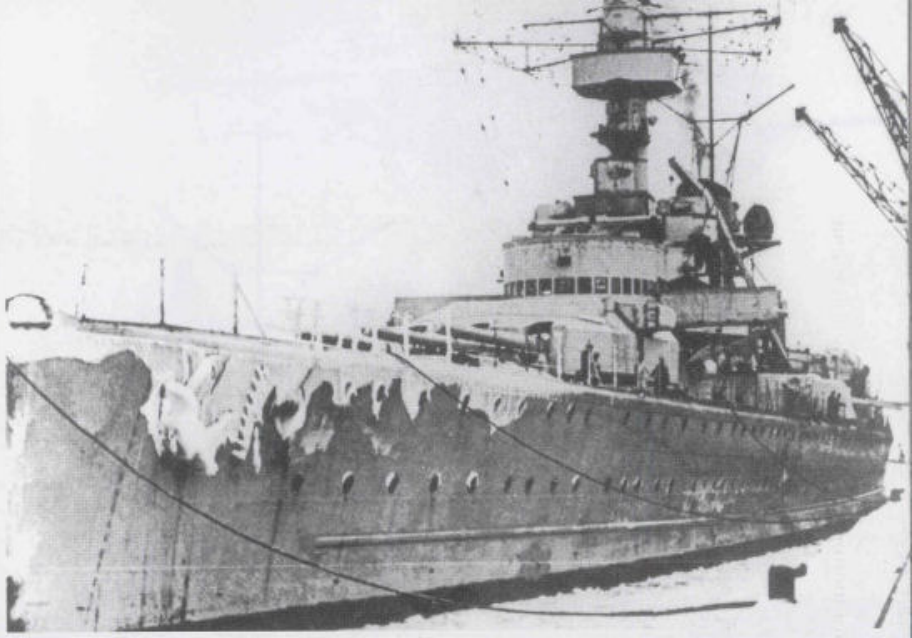
5 July 1942: Operation RÖSSELSPRUNG cancelled due in part to damage to LÜTZOW.
16 August 1942: Operation WUNDERLAND (WONDERLAND) to Kara Sea.
20 August 1942: Sank Soviet icebreaker SIBIRYAKOV.
27 August 1942: Bombarded Port Dikson; damaged two ships.
November 1942: Return to Wilhelmshaven for refit & designation as training ship.
November 1944: Began operations in Baltic against advancing Soviet forces.
March 1945: Transferred to Kiel for refit.
9 April 1945: Hit by five RAF bombs; capsized.

ADMIRAL GRAF SPEE:
1936-38: Served as fleet flagship.
1936-39: Neutrality Patrol off Spain.
21 August 1939: Left Wilhelmshaven for waiting area in South Atlantic.
26 September 1939: Released to raid commerce; sank nine ships in South Atlantic &

(Left) Passengers aboard a German ocean liner greet DEUTSCHLAND with Nazi salutes in 1938. The only visible signs of the repairs after the Ibiza bombing are a larger aircraft crane immediately forward of the funnel and a modified, larger mainmast. The upper funnel rim and the mast above the funnel were painted Black. This hid smoke stains on these surfaces. Spanish Neutrality patrol bands are painted on both main gun turrets. (NARS)



DEUTSCHLAND cruises off German's North Sea coast soon after World War Two began in 1939. A censor crudely removed her bow shield from this image for security purposes. DEUTSCHLAND's Yellow shield depicted the Black German eagle. The Nazi eagle and swastika emblem is affixed to the side of the front main gun turret. A funnel cap was installed in 1938.

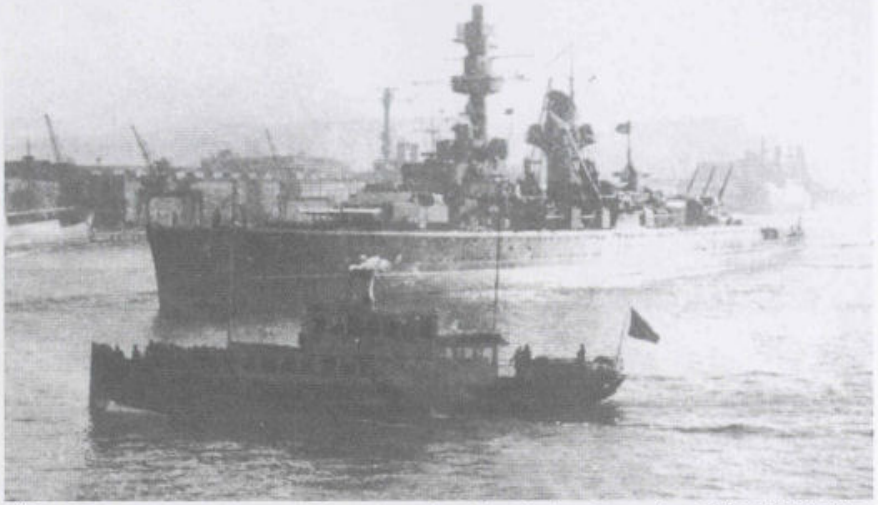


Sheets of ice covered LÜTZOW (as DEUTSCHLAND was renamed on 15 November 1939) while she lies at anchor during the hard winter of 1939-40. All pre-war German capital ships displayed the coat-of-arms of its namesake person or region on both sides of the bow. When DEUTSCHLAND (German for Germany) was renamed, Germany's insignia was removed and never replaced. (NARS)

Indian Ocean.
13 December 1939: Battle of the River Plate against British cruisers HMS EXETER and HMS AJAX and New Zealand cruiser HMNZS ACHILLES; entered Montevideo, Uruguay for repairs; allowed to remain only three days.
17 December 1939: Scuttled in Plate Estuary.

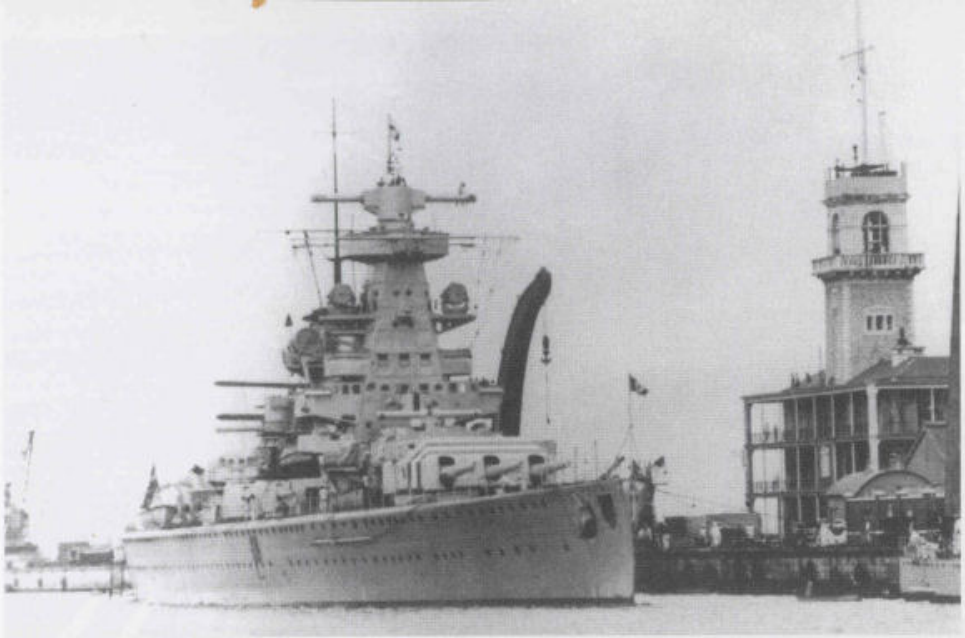
LÜTZOW helped provide support for the German invasion of Norway on 9 April 1940. Two days later, the British submarine HMS SPEARFISH attacked the German warship while it was returning to Kiel from Norwegian waters. One torpedo hit LÜTZOW in the aft hull, causing extensive damage. The fan-tail supporting structure collapsed and the hull immediately behind the after main turret was bent down. The hull breech allowed 1300 tons of water to flow into the ship, which caused her bow to rise by several meters. Weak aft hulls were a characteristic of German capital ships. LÜTZOW was towed back to Kiel for repairs, which kept her out of action until January of 1941. (*Bundesarchiv*)

The Germans took measures to reduce LÜTZOW's aft weight when she arrived back at Kiel on 12 April 1940. This sufficiently restored trim for her to enter drydock at Deutsche Werke. Lightening measures included removing both quadruple torpedo mounts on her fantail. The base ring for the starboard torpedo mount remains on the deck. The hull break that resulted from the British torpedo hit occurred right at the armor belt's aft end. (*Bundesarchiv*)



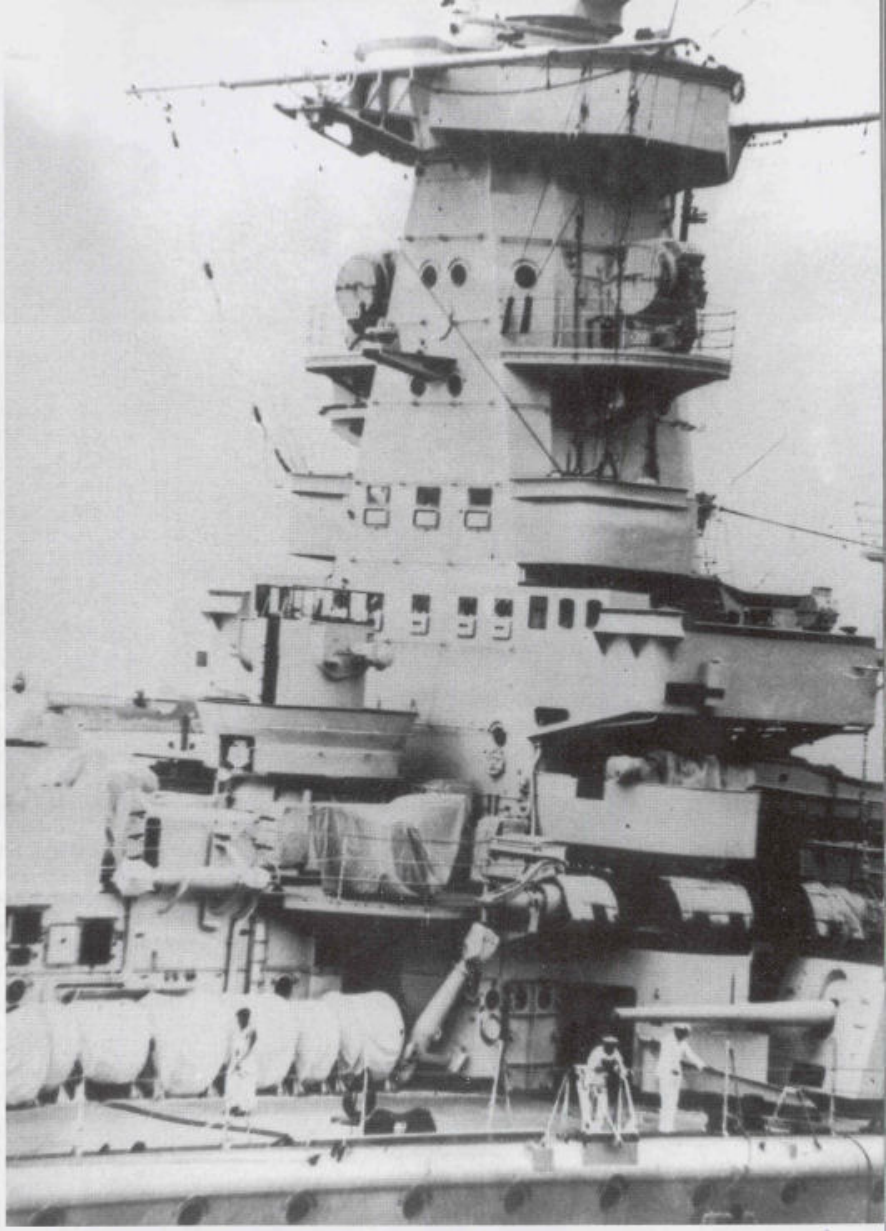
LÜTZOW ran aground soon after departing Narvik for Operation RÖSSELSPRUNG (HORSE JUMP) on 3 July 1942. This operation was intended to attack Allied Convoy PQ.17, which was bound for Russia. LÜTZOW was based at Gotenhafen (now Gdynia, Poland) following repairs. She is painted overall Baltic *Dunkelgrau* (Dark Gray), which proved effective in the Baltic. A pre-Dreadnought battleship believed to be SCHLESWIG-HOLSTEIN lies behind LÜTZOW's forward turret. (Via Ken Macpherson)

LÜTZOW was based at Narvik, Norway in the early Summer of 1942. She was painted in a splinter camouflage of Dark Gray on a Light Gray background. The idea behind this camouflage was that, at a distance, the two shades blended into a Medium Gray that faded into the horizon. Close up, the splinters were difficult for split prism rangefinders to focus on. LÜTZOW was retrofitted with the elongated 'clipper' bow similar to that on ADMIRAL SCHEER. (NHC)

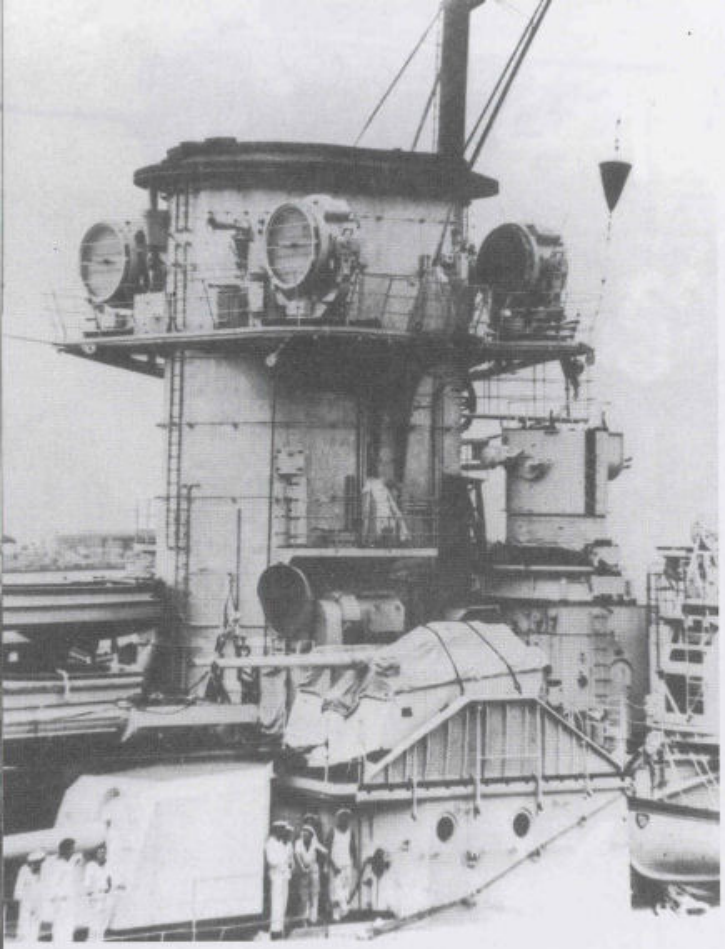


ADMIRAL SCHEER is tied up at the British colony of Gibraltar in early 1937. German ships participating in the Spanish Neutrality Patrol used the British port for resupply. Tri-colored patrol recognition bands are painted on her forward turret. The Black and White flag atop ADMIRAL SCHEER's forward main battery rangefinder indicated that the fleet admiral was aboard.

A crewman sweeps snow off ADMIRAL SCHEER's afterdeck while she is docked at Wilhelmshaven, Germany during the Winter of 1939-40. His back is beside the port quadruple torpedo mount. Tompions fitted to the 28 cm gun muzzles protected the gun barrels when the weapons were not in use. (*Bundesarchiv*)

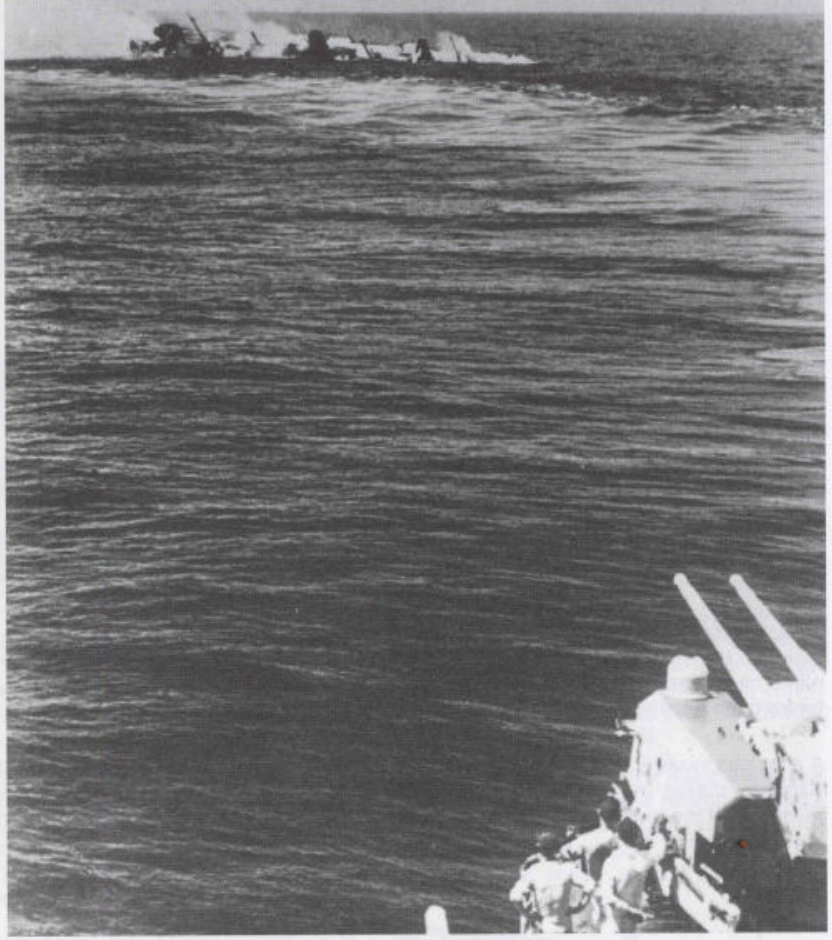


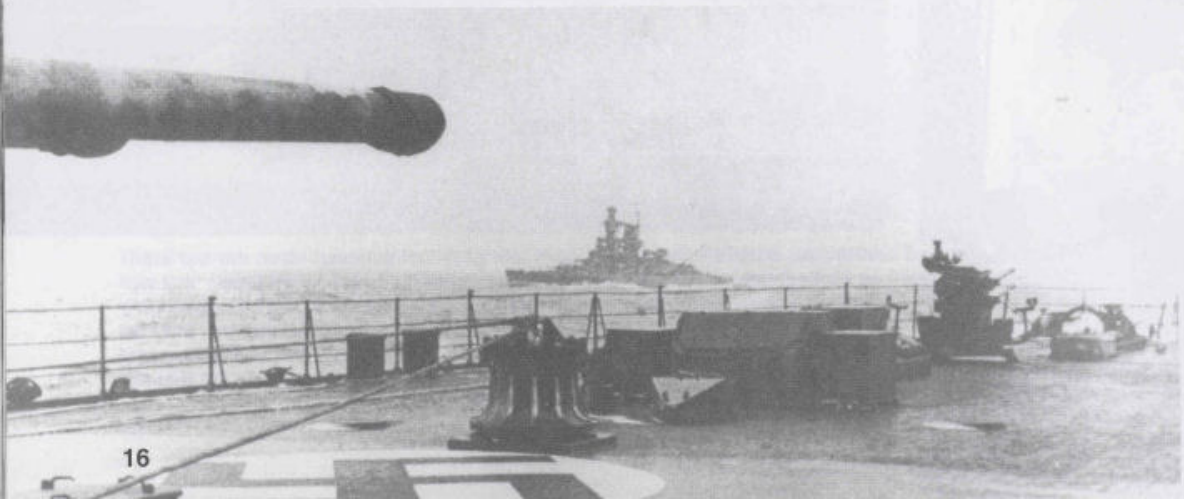
ADMIRAL SCHEER was undergoing refit at Wilhelmshaven when the war started in September of 1939. Her forward superstructure was originally a tower mast similar to that on her sister ADMIRAL GRAF SPEE. ADMIRAL SCHEER's tower was replaced by a smaller structure, somewhat similar to that on DEUTSCHLAND, during this refit. An optical rangefinder for her secondary battery is mounted in a tube forward of this tower, while searchlights are located on platforms flanking the upper section. (NHC)



(Left) Searchlights are mounted on a platform high on the side of ADMIRAL SCHEER's funnel prior to her 1939 refit. A small cap was fitted to this funnel at Wilhelmshaven. It prevented diesel exhaust from blowing back on to the control tops. (NHC)

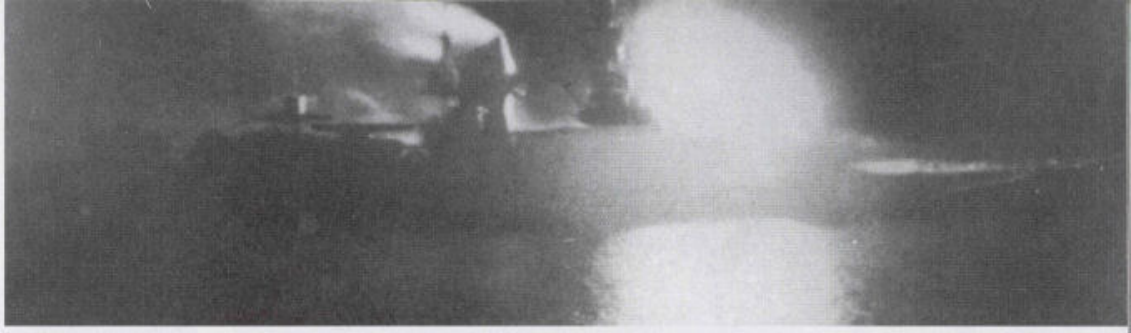
(Right) An Allied merchant ship sinks after ADMIRAL SCHEER attacked it somewhere in the South Atlantic. Several crewmen watch the sinking from beside one of ADMIRAL SCHEER's twin mount 10.5 cm (4.1-inch) SK C/33 anti-aircraft guns. ADMIRAL SCHEER demonstrated what a lone commerce raider loose on the open ocean could accomplish during a voyage between October of 1940 and April of 1941. She sank 17 ships totaling over 100,000 tons during this six-month cruise, which took ADMIRAL SCHEER as far as the Seychelles in the Indian Ocean. (*Bundesarchiv*)



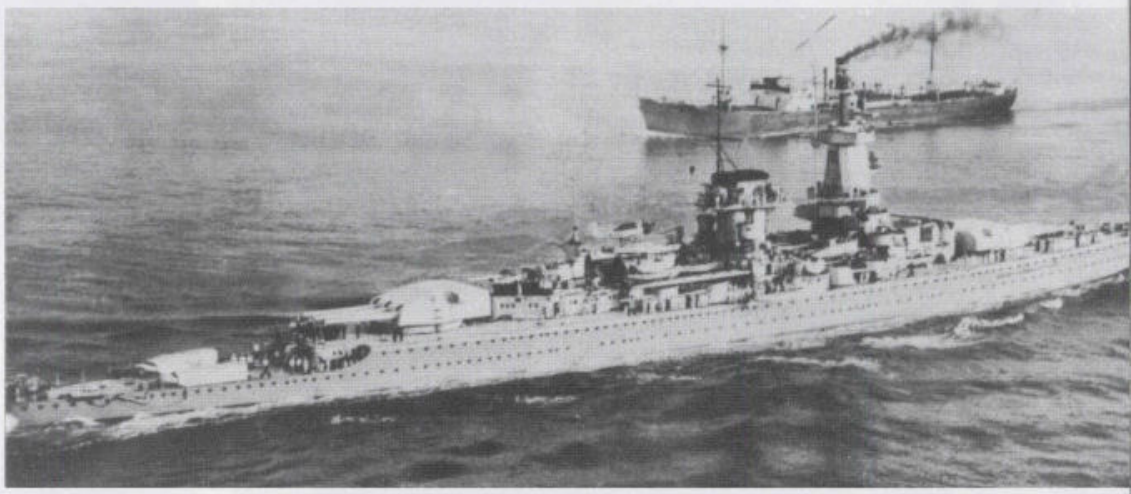


ADMIRAL SCHEER transferred from Brunsbüttel, Germany to Trondheim, Norway in late February of 1942. The ADMIRAL HIPPER Class heavy cruiser PRINZ EUGEN and three destroyers accompanied her. ADMIRAL SCHEER passes astern of PRINZ EUGEN during the cruise to Trondheim. She received a taller funnel cap in a brief refit after her six-month long commerce-raiding cruise. Her 'clipper' bow was fitted in her 1940 refit. This bow had slightly increased rake and sheer over her previous near vertical stem. This new bow partially resolved the problem of wetness forward. The British submarine HMS TRIDENT torpedoed PRINZ EUGEN off Trondheim on 23 February 1942, but ADMIRAL SCHEER arrived without damage. (NHC)

ADMIRAL SCHEER, like many *Kriegsmarine* units, ended World War Two supporting the retreat of German troops along the Baltic shore. Her three forward 28 CM guns fire at night near Pillau (now Baltiysk, Russia), just south of East Prussia's Samland Peninsula.

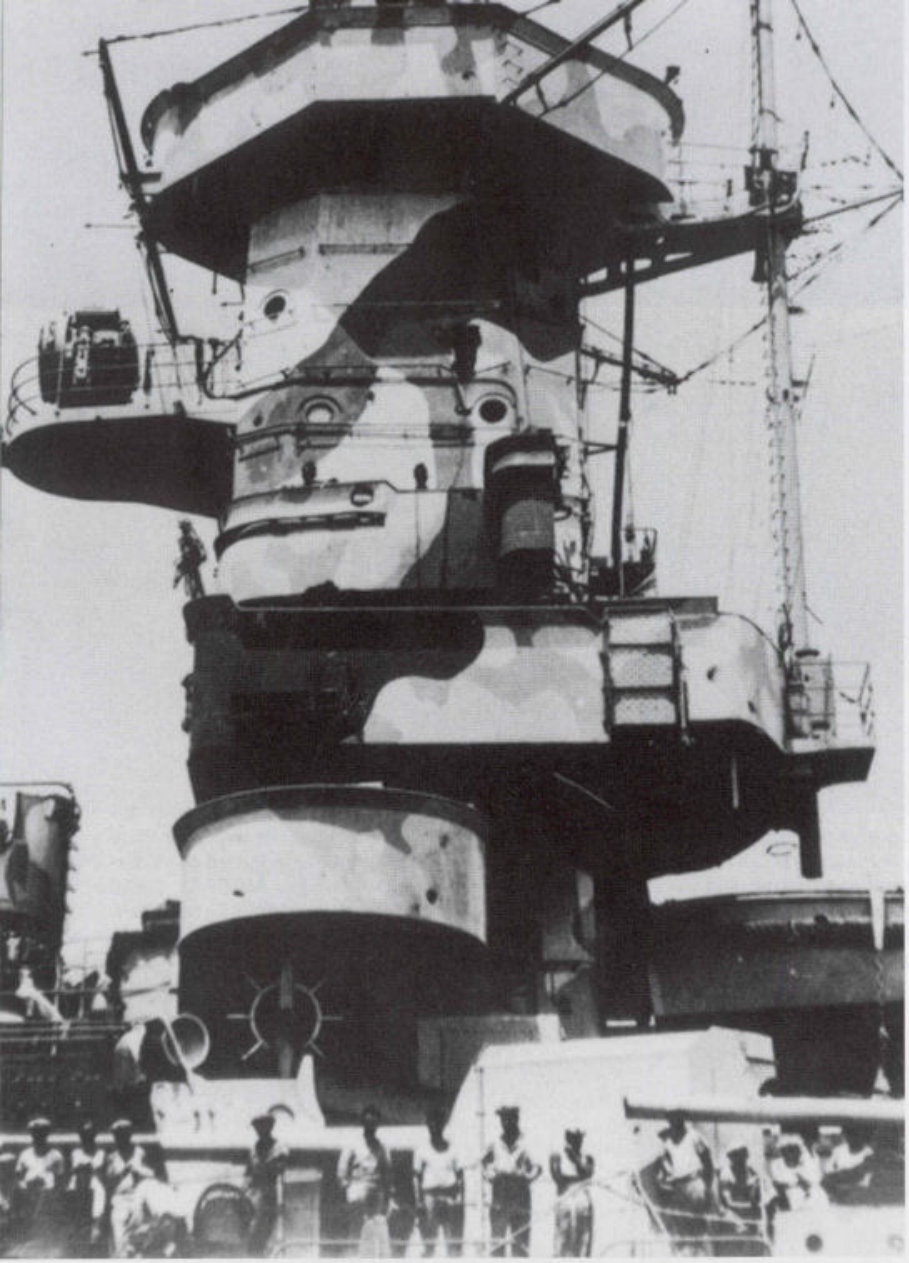


ADMIRAL GRAF SPEE passes a merchant ship while cruising through the English Channel on 21 August 1939. The warship was bound from Wilhelmshaven for her assigned holding area in the South Atlantic prior to the start of hostilities. Three days later, sister ship DEUTSCHLAND headed north to a holding area south of Greenland. *Oberkommando der Marine* (OKM; Naval High Command) released ADMIRAL GRAF SPEE to raid Allied commerce on 26 September. (Via Bob Cressman)

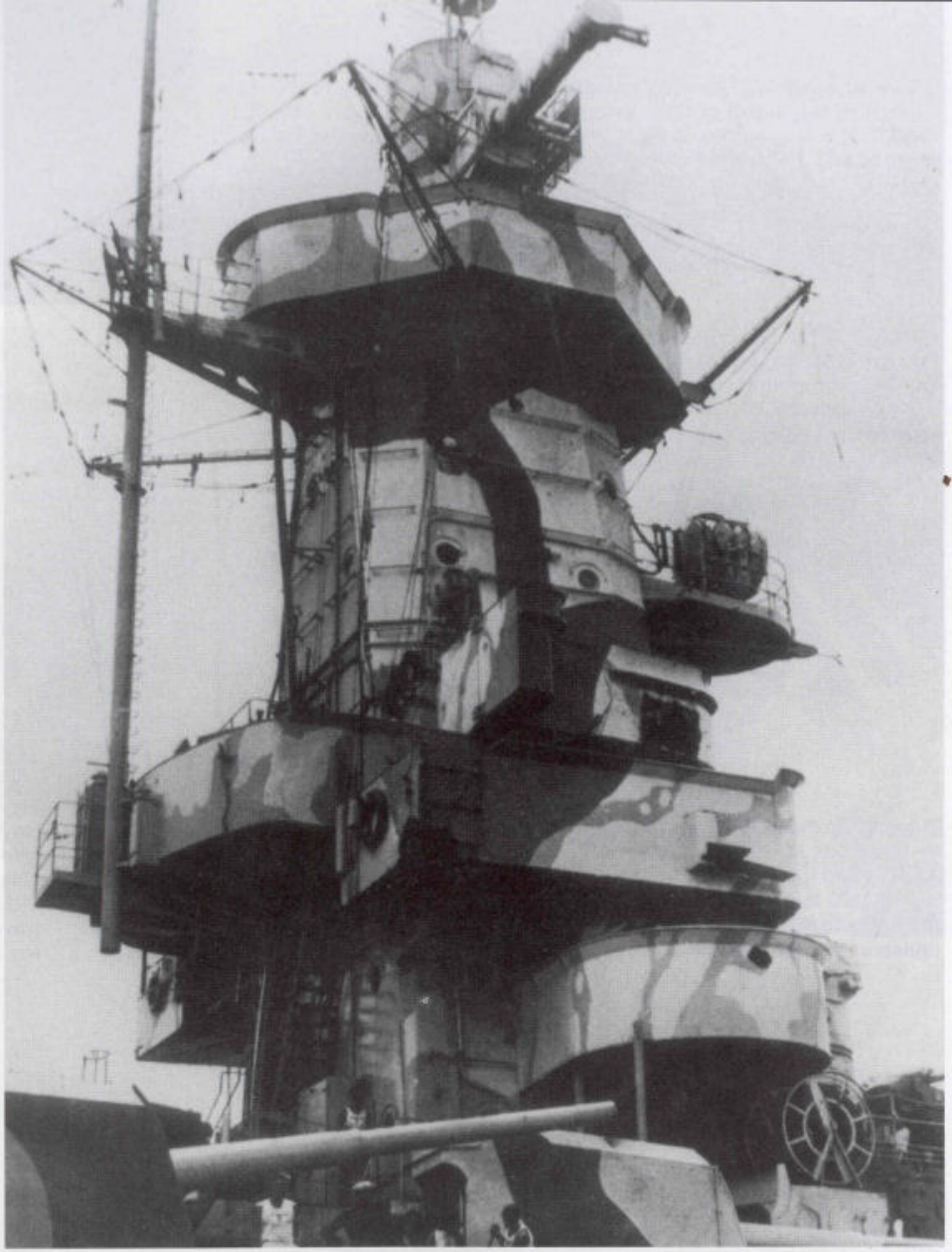


Tugboats gather to port of ADMIRAL GRAF SPEE as she enters the harbor at Montevideo, Uruguay on 13 December 1939. She had preyed on Allied merchant shipping in the South Atlantic and Indian Ocean from 26 September. ADMIRAL GRAF SPEE sank nine ships of over 50,000 tons during that period. This forced the Royal Navy to deploy Force G from the Falkland Islands. This force consisted of the heavy cruiser HMS EXETER and the light cruisers HMS AJAX and HMNZS ACHILLES, the latter a New Zealander ship. (NHC)

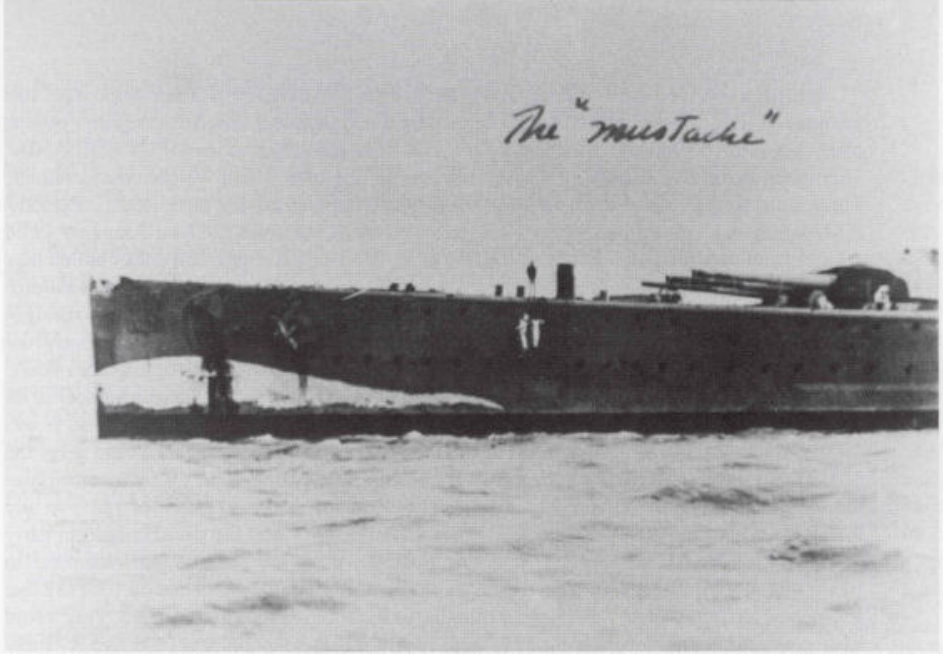
On 13 December, Force G engaged ADMIRAL GRAF SPEE off the mouth of the River Plate (*Rio de la Plata*). The German ship was attacked from both sides and sustained considerable damage, although she inflicted some damage on her opponents. ADMIRAL GRAF SPEE broke off the battle and reached Montevideo late on 13 December. A White false bow wave was painted on her bow, while Medium Gray and Dark Gray bands were painted on her superstructure.



ADMIRAL GRAF SPEE's crew devised and painted the superstructure camouflage pattern during her three-month cruise. Medium Gray and Dark Gray bands were painted in a random fashion over the Light Gray base color. The two port 15 CM (5.9-inch) guns are sited by the superstructure's base. A searchlight is mounted on a platform on the superstructure's forward surface. (NHC)

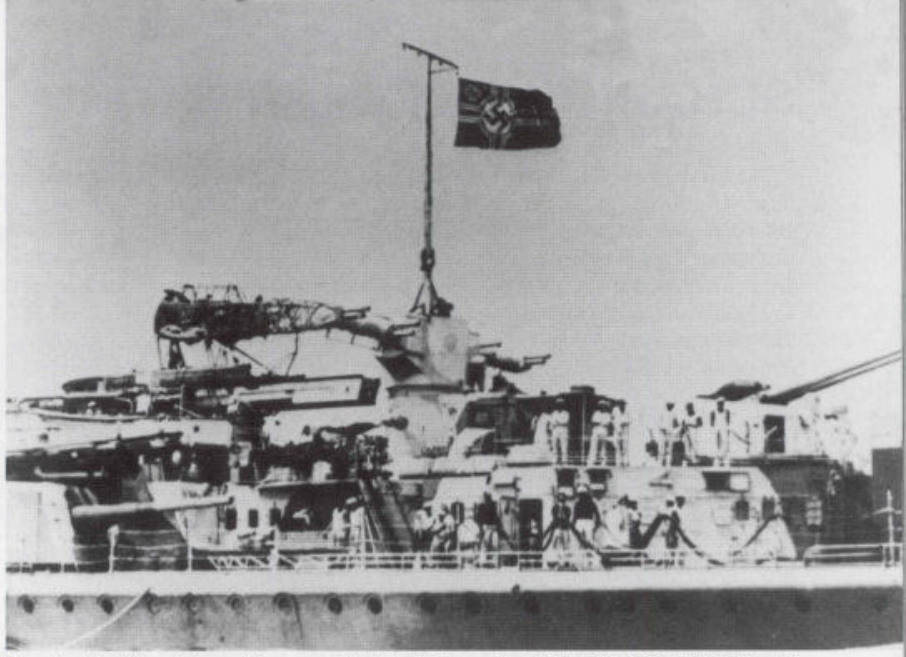


A completely different camouflage pattern was used on the starboard side of ADMIRAL GRAF SPEE's superstructure. The FuMO 22 surface search radar antenna is mounted in front of the forward main battery rangefinder atop this superstructure. This radar was installed in 1938, two years after an experimental model was installed on this ship. Several crewmen gather near the starboard 15 CM guns while docked in Montevideo. (NHC)



Two sailors lowered over the side work on repairing a shell hole in ADMIRAL GRAF SPEE's port bow. This occurred while she was docked in Montevideo on 14 December 1939. A Royal Navy photo interpreter added *The 'Mustache'* to this print in an apparent reference to her white false bow wave. (NHC)

The Uruguayan government was sympathetic with the Nazis and wanted ADMIRAL GRAF SPEE to stay longer than the three days allowed by international law. Diplomatic pressure and disinformation that a reinforced British squadron awaited offshore forced the hand of her commander, *Kapitän zur See* (Captain) Hans Langsdorff. On 17 December 1939, Langsdorff ordered a skeleton crew to navigate ADMIRAL GRAF SPEE along the Plate Estuary's north shore, then had scuttling charges set off to sink her.



The *Reichskriegsflagge* (German War Flag) flies atop ADMIRAL GRAF SPEE's aft main battery rangefinder at Montevideo after the Battle of the River Plate. A burned out Arado Ar 196 floatplane rests on the catapult, while a 10.5 cm (4.1-inch) SK C/33 anti-aircraft gun dual mount is sited aft of the rangefinder.

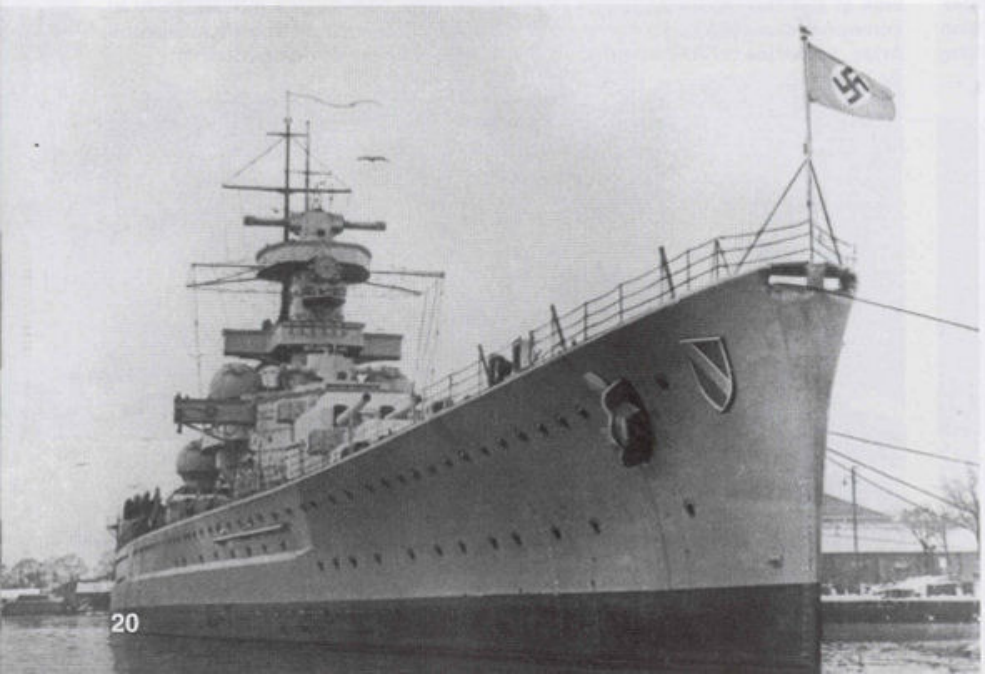
ADMIRAL GRAF SPEE sank upright in shallow water, which left her maindeck exposed. This allowed Allied naval representatives to scour the wreck for a close look at German technology. One of her three twin 10.5 cm gun mounts rests in somewhat damaged condition. *Kapitän* Langsdorff committed suicide in Buenos Aries, Argentina on 20 December 1939 – three days after scuttling his ship.

SCHARNHORST Class

The battleships[1] SCHARNHORST and GNEISENAU were originally intended as slightly improved versions of the DEUTSCHLAND class, with the same basic parameters of speed, armament, and protection. The Allies' exaggerated response to the DEUTSCHLANDs – particularly the French battleship DUNKERQUE ordered in 1931 – forced the *Reichsmarine* leadership to accept that the DEUTSCHLANDs would probably have only limited effectiveness in any future conflict. Thus, building two more ships to the same basic design would be foolish. The Nazis' rise to power in 1933 emboldened the *Reichsmarine* to propose improving the two remaining *Panzerschiffe* (Armored Ships) in all fighting characteristics, with the obvious implication that the 10,000-ton limit would be far exceeded. These ships were to be: faster, with a designed speed of 32 knots; better armed, with nine 28 CM (11-inch) guns; and, far better protected, with a maximum belt thickness of 380MM (15 inches) and two armored decks instead of one. Hitler wavered, initially approving all the proposed changes except for adding the third main turret and insisting that displacement be kept under 20,000 tons. It took the *Reichsmarine* almost a year to convince Hitler that the third turret was necessary and to abandon any pretense of adhering to treaty limits. He authorized the two ships in 1934 with a planned displacement of 26,000 tons, although design changes before construction started raised that to 34,000 tons. The envisaged full load displacement was 39,000 tons.

[1]The Germans regarded both SCHARNHORST and GNEISENAU as *Schlachtschiffe* (Battleships), but the British referred to them as battlecruisers.

SCHARNHORST is moored soon after her commissioning on 7 January 1939. Her lightly loaded condition has exposed her *Wasserlinienfarbe I 23a Grau* (Waterline Color I 23a Gray) boot topping. SCHARNHORST's belt armor fit smoothly into the hull's curve, instead of being placed outside the hull lines as on the earlier DEUTSCHLANDs. The ship's crest is mounted immediately aft of her original straight stem. (NHC)

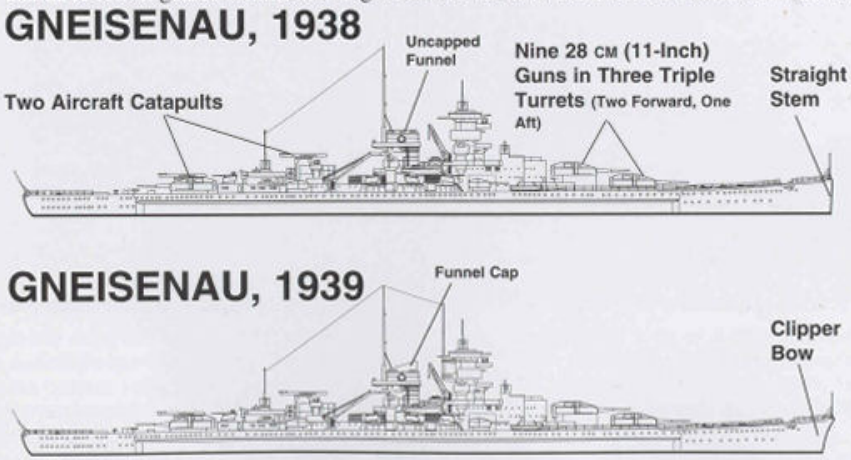


Originally conceived as commerce raiders like the DEUTSCHLANDs, these ships were also intended to have a diesel powerplant. The increased displacement raised the required powerplant output to 160,000 SHP, which was more than triple the output of the DEUTSCHLANDs. This made the use of diesels effectively impossible due to size and weight considerations. These ships were completed with high-pressure steam turbines driving three shafts. GNEISENAU was commissioned on 21 May 1938, followed by SCHARNHORST on 7 January 1939.

Even more than the DEUTSCHLANDs, the SCHARNHORSTs were odd ducks in that they fit no known niche in the contemporary view of naval power. They were fast and well-protected, but were seriously undergunned for their size. After all the effort that went into designing and building these ships, the result was two vessels that couldn't take on contemporary battleships in a head-to-head fight. They were effectively even more oversized commerce raiders. In 1934, there was discussion of replacing the 28 CM main battery with a smaller number of 38 CM (15-inch) or 40.6 CM (16-inch) guns, but no such guns or turrets existed at the time. It was estimated that the design, testing, and construction of the necessary hardware would delay the SCHARNHORSTs' laying down by two years. Additionally, Hitler didn't want to antagonize the British in the midst of negotiating the Anglo-German Naval Agreement of 1935, so any main gun caliber upgrade was rejected. When GNEISENAU was heavily damaged in early 1942, it was decided to proceed with this upgrade, using turrets and guns identical to BISMARCK's. GNEISENAU's forecastle was to be widened and lengthened by 10 M (32 feet 9.7 inches) to add buoyancy and restore trim due to the additional weight forward. This would have increased overall length from 234.9 M (770 feet 8 inches) to 244.9 M (803 feet 5.7 inches). In any event, sanity prevailed and the worsening war situation prevented this work from proceeding beyond the dismantling of GNEISENAU's damaged bow.

SCHARNHORST was 226 M (741 feet 5.6 inches) long at the waterline and 229.8 M (753 feet 11.2 inches) overall as launched. She had a beam of 30 M (98 feet 5.1 inches), a draft of 8.2 M (26 feet 10.8 inches) at standard displacement, and 9.1 M (29 feet 10.3 inches) at full load. GNEISENAU had the same dimensions at the time. Both ships were fitted with a new, more curved bow in 1939-40, which increased overall length to 234.9 M (770 feet 8 inches). The full load displacement of the SCHARNHORSTs during the war was approximately 38,900 tons.

The SCHARNHORSTs were each powered with 12 Wagner high-pressure oil-fired boilers and three sets of geared turbines driving three screws. SCHARNHORST's turbines were made



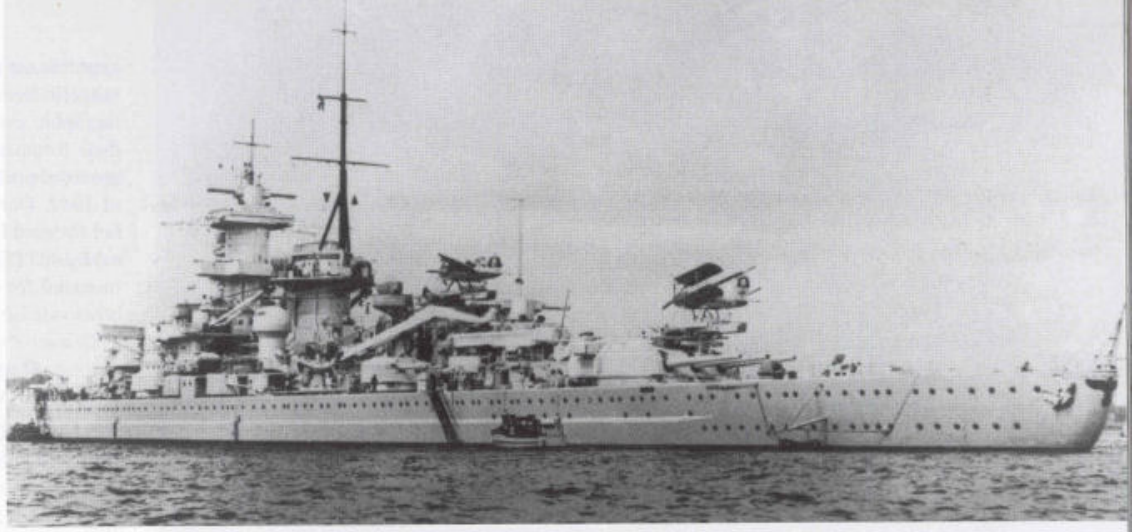
by Brown-Boveri; GNEISENAU's by Germania. This machinery gave a design output of 165,000 SHP and a maximum speed of 32 knots, but practical results were somewhat less. The actual maximum output was approximately 160,000 SHP and the maximum speed was 31 knots. Their range was 8800 NM (10,133 miles/16,308 KM) at 19 knots and 10,000 NM (11,515 miles/18,531 KM) at 17 knots.

Both SCHARNHORSTs had belt armor thickness up to 350MM (13.8 inches). They also had a 45MM (1.8-inch) thick inner torpedo bulkhead that ran from the armored deck down to the inner bottom. The main armored deck was 50MM (2 inches) thick, with a 105MM (4.1-inch) thick extension angling down to the bottom of the side armor. They also had a 20MM (0.8-inch) thick bulkhead from the armored deck up to the 50MM thick armored main deck. The armor used in the SCHARNHORSTs was mostly Wh (*Wohan hart*; Wohan hard) homogeneous steel, which had significantly greater tensile strength than the KC (*Krupp Cementite*; Krupp Cemented) face-hardened alloy armor used in the DEUTSCHLANDs.

The ships' complements varied from a low of 1669 to a maximum of 1840. The latter figure included prize crews at the start of a wartime commerce raid.

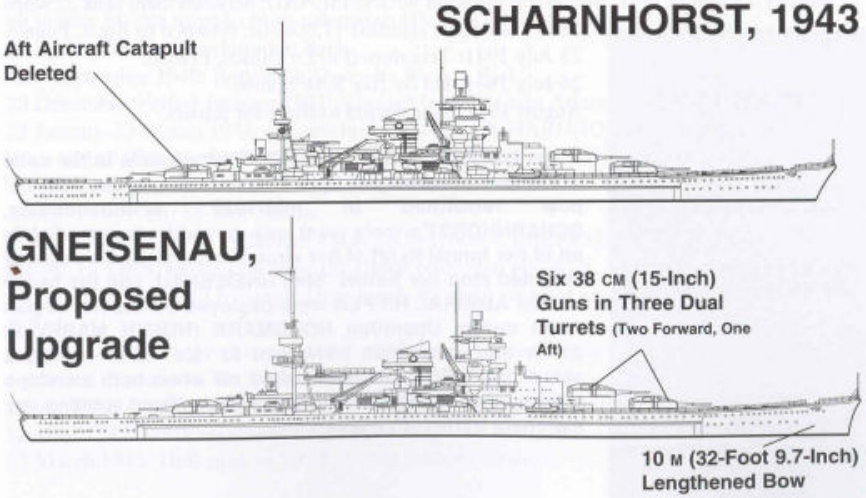
Primary armament consisted of nine 28 CM (11-inch) SK C/28 naval rifles mounted in three triple-turrets: two forward and one aft. This was the same model gun used in the DEUTSCHLANDs with the same specifications. The secondary battery was twelve 15 CM (5.9-inch) SK C/28 guns in four twin-turrets and four shielded single mounts. At launch, the Anti-Aircraft (AA) battery consisted of fourteen 10.5 CM (4.1-inch) SK C/33 guns in seven twin mounts, sixteen 3.7 CM SK C/30 cannon in twin mounts, and ten 20MM *Flak* 38 cannon in single mounts. These 20MM mounts were removed before the war broke out. New 20MM *Flakvierling* 38 quad mounts were added starting in 1941 until they reached a maximum of six quads on SCHARNHORST.

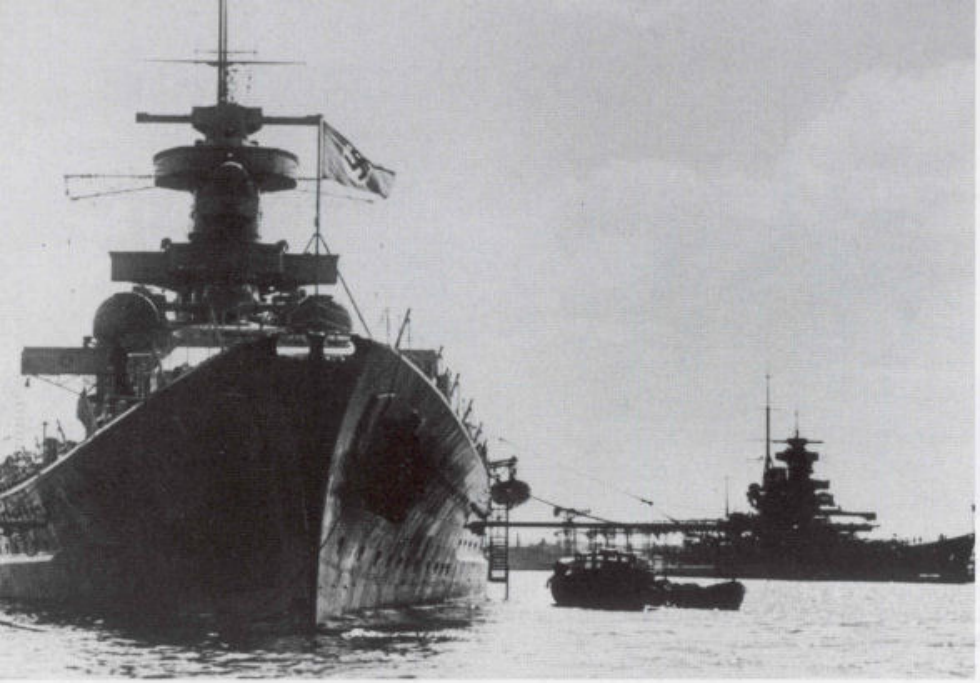
Both ships were designed without torpedo armament, but both carried six 53.3 CM (21-inch) torpedo tubes in triple mounts on the main deck from 1941. The tubes were originally mounted on *Kriegsmarine* light cruisers and were fitted on the SCHARNHORSTs without any of their associated fire control systems. These tubes were loaded with standard G7a steam-driven torpedoes as used in the DEUTSCHLANDs.



GNEISENAU was commissioned on 21 May 1938 – just over seven months before her sister SCHARNHORST. GNEISENAU is fitted with two aircraft catapults: one on a rotating platform aft of the funnel, and the other rigidly fixed atop of the after main battery turret. A Heinkel He 114 is spotted on the forward catapult and an Arado Ar 95 on the after turret catapult in late 1938. Neither aircraft saw front line service during World War Two. (NHC)

Crews man the rails and signal pennants fly from every yard during the last peacetime fleet review. This was held at Kiel, Germany on 22 August 1938. GNEISENAU leads ADMIRAL GRAF SPEE, ADMIRAL SCHEER, and DEUTSCHLAND, with two lesser ships at the end. Rigging in the foreground belonged to the reviewing ship. (NHC)


SCHARNHORST, 1943
Aft Aircraft Catapult Deleted
GNEISENAU, Proposed Upgrade
Six 38 CM (15-Inch) Guns in Three Dual Turrets (Two Forward, One Aft)
10 M (32-Foot 9.7-Inch) Lengthened Bow



SCHARNHORST (left) and GNEISENAU lie in port – probably Wilhelmshaven – just prior to World War Two. GNEISENAU's bow was modified to the distinctive 'Atlantic' clipper bow, which was more raked and flared than the modified bows of the DEUTSCHLAND Class *Panzerschiffe*. Despite this modification, the SCHARNHORSTS remained wet in any kind of weather. (*Bundesarchiv*)

Main battery fire control was provided by five 10.5 M (34-foot 5.4-inch) optical rangefinders. One each was located atop the fore and aft superstructures and one was mounted in each of the three main turrets. In November of 1939, both SCHARNHORSTs were fitted with an FuMO 22 search radar to the foremast. This radar used a 2 M (6 feet 6.7 inches) high by 6 M (19 feet 8.2 inches) wide mattress-type antenna mounted above the foremast rangefinder. They kept this set throughout their careers. Both ships were fitted with an FuMO 27 set on their aft rangefinder in Brest in the summer of 1941. It is believed, but not confirmed by available photographic evidence, that both ships had an FuMB *Ant* 6 *Palau* antenna added to the back of their foremast for use with an unidentified (probably *Samos* [FuMB 4]) radar detector set, mounted prior to Operation CERBERUS – the dash through the English Channel – in February of 1942. During her refit after this 'Channel Dash', SCHARNHORST is known to have had her forward FuMO 22 replaced with an FuMo 26 or 27 set with a smaller 2 M (6 feet 6.7 inches) by 4 M (13 feet 1.5 inches) antenna. Below this antenna, an FuMB *Ant* 7 *Timor* antenna was mounted for use with an FuMB 4 detector. This replaced the *Palau* antenna mounted on the other side of the foretop.

Battle Histories of SCHARNHORST Class Ships:

SCHARNHORST:

July-September 1939: Post-trials refit at Wilhelmshaven.
21-27 November 1939: Sortie w/GNEISENAU to vicinity of Iceland as diversion for ADMIRAL GRAF SPEE.
23 November 1939: Sank auxiliary cruiser HMS RAWALPINDI.
18-20 February 1940: Aborted sortie w/GNEISENAU (Operation NORDMARK; NORTHMARK) to vicinity of Shetlands.
7 April 1940: Operation WESERÜBUNG (WESER EXERCISE – the invasion of Norway); sorties w/GNEISENAU as part of cover force; patrols off west coast of Norway.
9 April 1940: Brief engagement with battlecruiser HMS RENOWN; no damage.
4-9 June 1940: Sortie into Arctic w/GNEISENAU (Operation JUNO) to intercept evacuation of Norway; returns to Trondheim, Norway.
8 June 1940: Sank aircraft carrier HMS GLORIOUS and destroyers HMS ACASTA and HMS ARDENT; damaged by torpedo from ACASTA.
11-13 June 1940: Attacked by RN aircraft from carrier HMS ARK ROYAL in Trondheim; no damage.
21 June 1940: Return to Kiel.
July-October 1940: Repairs at Deutsche Werke, Kiel.
28 December 1940-3 January 1941: Aborted breakout into Atlantic w/GNEISENAU.
22 January-23 March 1941: Successful breakout w/GNEISENAU; between them sank 22 ships of 115,000 tons; steamed 17,800 NM; returned to Brest, France.
23 July 1941: Transferred to La Pallice, France.
24 July 1941: Hit by five RAF bombs.
August 1941: Transferred to Brest for repairs.

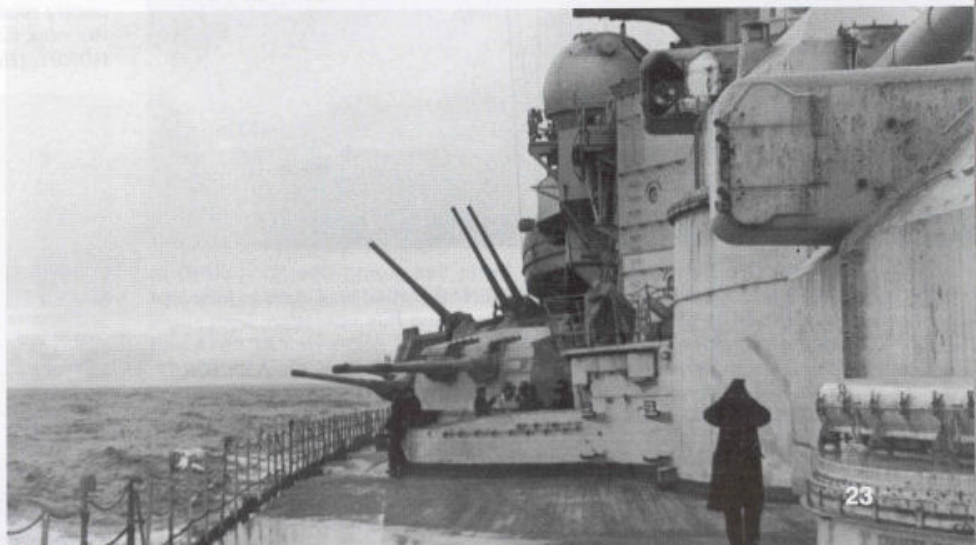
Water breaks over SCHARNHORST's forecastle in the calm North Sea in February of 1940. This was despite the 'Atlantic' bow retrofitted in mid-1939. Simultaneously, SCHARNHORST's main mast was moved from immediately aft of her funnel to aft of her aircraft catapult and a cap was mounted atop her funnel. She, GNEISENAU, and the heavy cruiser ADMIRAL HIPPER were deployed off the Norwegian coast during Operation NORDMARK (NORTH MARK), in which these warships were sent to raid Allied merchant shipping. NORDMARK was called off when both warships reached the latitude of Bergen, Norway without spotting any merchant traffic. (*Bundesarchiv*)

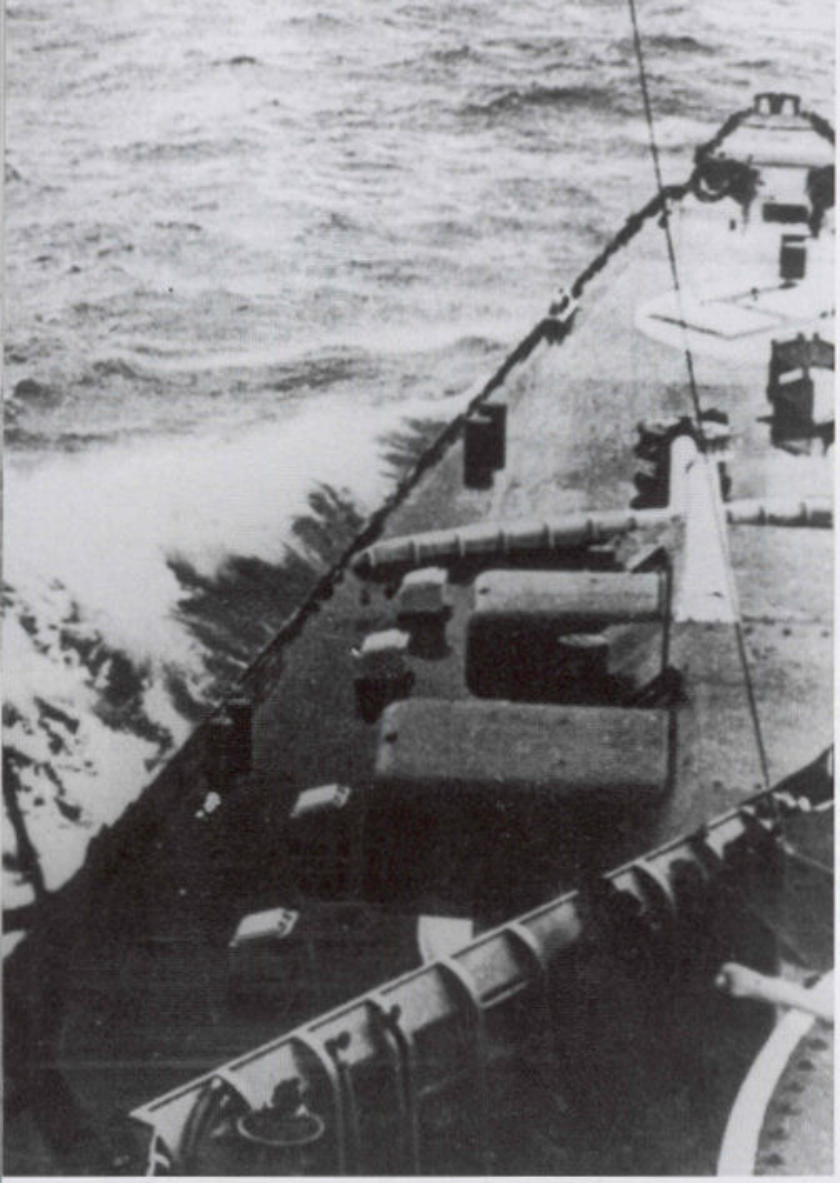
11-13 February 1942: 'Channel Dash' (Operation CERBERUS) w/GNEISENAU and heavy cruiser PRINZ EUGEN; struck two mines off Dutch coast; put into Wilhelmshaven.
15 February 1942: Transferred to Kiel.
February-October 1942: Repairs at Deutsche Werke.
11 January 1943: Attempted transfer to Norway aborted due to sighting by RAF; returned to Kiel.
8-10 March 1943: Transferred to Altafjord, Norway.
6-9 September 1943: Operation SIZILIEN (SICILY) against Spitzbergen w/TIRPITZ; landed troops and shelled island.
25 December 1943: Operation against Allied Convoy JW.55B.
26 December 1943: Battle of the North Cape – Engages RN cruisers; hit twice by 8-inch (20.3 CM) shells from heavy cruiser HMS NORFOLK, disabling radar; later, in separate engagement, hits NORFOLK twice with 11-inch shells; later engages battleship HMS DUKE OF YORK; RN destroyers obtain four torpedo hits which bring SCHARNHORST to a halt; hit by at least ten more torpedoes and gunfire from DUKE OF YORK and cruisers, SCHARNHORST sinks; 36 survivors rescued by RN.

GNEISENAU:
7-10 October 1939: Aborted sortie to Norwegian coast.
21-27 November 1939: Sortie w/SCHARNHORST to vicinity of Iceland as diversion for ADMIRAL GRAF SPEE.
18-20 February 1940: Aborted sortie w/SCHARNHORST (Operation NORDMARK) to vicinity of Shetlands.
7 April 1940: Operation WESERÜBUNG (the invasion of Norway); sorties w/SCHARNHORST as part of cover force; patrols off west coast of Norway.
9 April 1940: Brief engagement with battlecruiser HMS RENOWN; hit by three shells.
12 April 1940: Repairs at Wilhelmshaven.
4-9 June 1940: Sortie into Arctic w/SCHARNHORST (Operation JUNO) to intercept evacuation of Norway; returns to Trondheim.
8 June 1940: Sank aircraft carrier HMS GLORIOUS and destroyers HMS ACASTA and HMS ARDENT; no damage.
10-11 June 1940: Aborted breakout to Atlantic; returned to Trondheim.
20 June 1940: Diversionary sortie from Trondheim to cover SCHARNHORST's return to Kiel; hit in bow by one torpedo from submarine HMS CLYDE; return to Trondheim.
25-27 July 1940: Transferred to Kiel.
July-September 1940: Repairs at Deutsche Werke, Kiel.
28 December 1940-3 January 1941: Aborted breakout into Atlantic w/SCHARNHORST.
22 January-23 March 1941: Successful breakout w/SCHARNHORST; between them sank 22 ships of 115,000 tons; steamed 17,800 NM; returned to Brest.
6 April 1941: Hit by one aerial torpedo in harbor at Brest.
10 April 1941: Hit by four bombs.
11-13 February 1942: 'Channel Dash' (Operation CERBERUS) w/SCHARNHORST and PRINZ EUGEN; struck one mine off Dutch coast; put into Kiel.
26 February 1942: Hit by single large bomb forward; forward magazines burnt out; forecastle gutted.
4 April 1942: Towed to Gotenhafen (now Gdynia, Poland) where plans made to replace forecastle and upgrade to 38 CM main battery.
1 July 1942: decommissioned at Gotenhafen; removal of forecastle started.
January 1943: Work on conversion suspended.
27 March 1945: Hull sunk as block ship at harbor entrance.

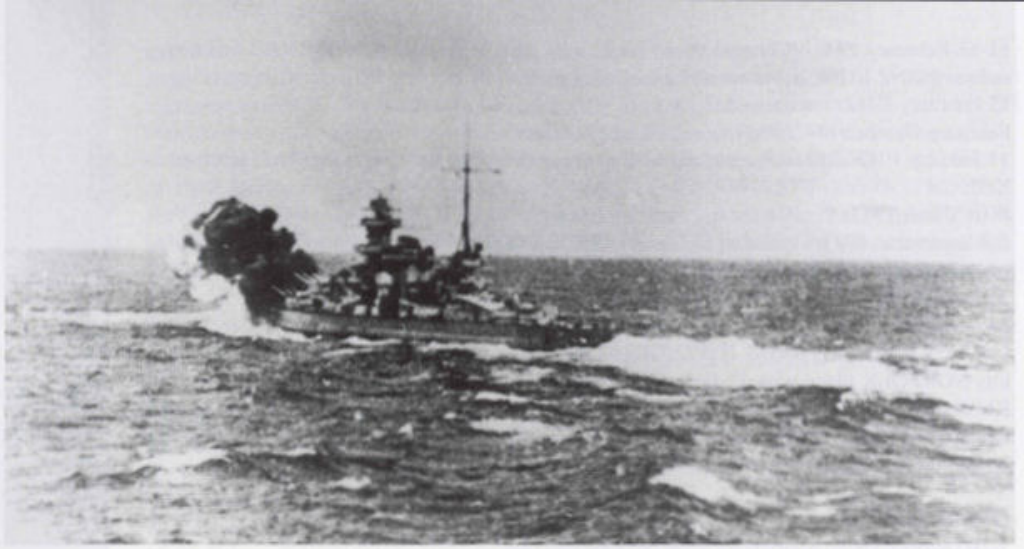
SCHARNHORST is docked at Wilhelmshaven after completing post-refit trials in early 1939. Her clipper bow increased the overall length by 5.1 M (16 feet 8.8 inches), to 234.9 m (770 feet 8 inches). (*Bundesarchiv*)

Some of SCHARNHORST's 10.5 CM (4.1-inch) SK C/33 anti-aircraft guns point skyward off Norway's Atlantic coast in April of 1940. She helped provide cover for the German invasion forces during Operation WESERÜBUNG (WESER EXERCISE). Three of the 15 CM (5.9-inch) secondary guns – a twin mount and a single mount – are located below the 10.5 CM weapons. Rangefinder covers are opened on the B (*Berta*) main turret, but are closed on the A (*Anton*) turret. (ECPA)





SCHARNHORST slices through the North Sea during Operation JUNO in June of 1940. She and her sister GNEISENAU sortied on 4 June to intercept British forces evacuating from Norway. During this operation, both ships sank the aircraft carrier HMS GLORIOUS and the destroyers ACASTA and ARDENT; however, a torpedo fired by ACASTA damaged SCHARNHORST. The air recognition insignia on SCHARNHORST's bow consists of a Black swastika on a White disc, which is placed on a Red background. (NHC)

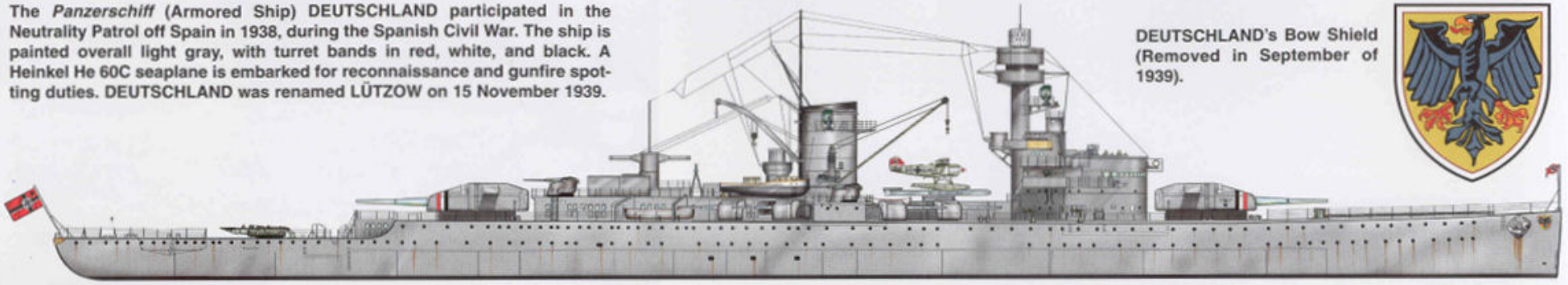


SCHARNHORST fires her 28 cm (11-inch) main guns at the British aircraft carrier HMS GLORIOUS on 8 June 1940. GLORIOUS' flight deck was loaded with aircraft evacuated from Norway and she lacked an effective response to the German attack. She went down within 30 minutes after SCHARNHORST and GNEISENAU engaged the carrier. (NHC)

SCHARNHORST steams through the English Channel on 12 February 1942. The night before, she, GNEISENAU, and the heavy cruiser PRINZ EUGEN had successfully sailed from Brest, France on Operation CERBERUS, the so-called 'Channel Dash' through the English Channel. OKM (Naval High Command) ordered this operation in order to redeploy these warships in Norway, where they could pose a greater threat to Allied forces in the North Sea. Additionally, it was felt that these ships would be less vulnerable to British air attacks in Norway than at Brest. Anti-aircraft gunners on the German warships and *Luftwaffe* fighters combined to drive off belated and uncoordinated British air attacks on these vessels. The passage east of the Strait of Dover proved the most dangerous part of the route, due to increased British attacks and the danger of floating mines. SCHARNHORST struck two mines that temporarily stopped her, but she resumed her voyage and entered Wilhelmshaven on 13 February for temporary repairs. *Vizeadmiral* (Vice Admiral) Otto Ciliax led Operation CERBERUS from SCHARNHORST. His rank flag was flown from atop the main mast. Two German fighters fly top cover above SCHARNHORST. (*Bundesarchiv*)

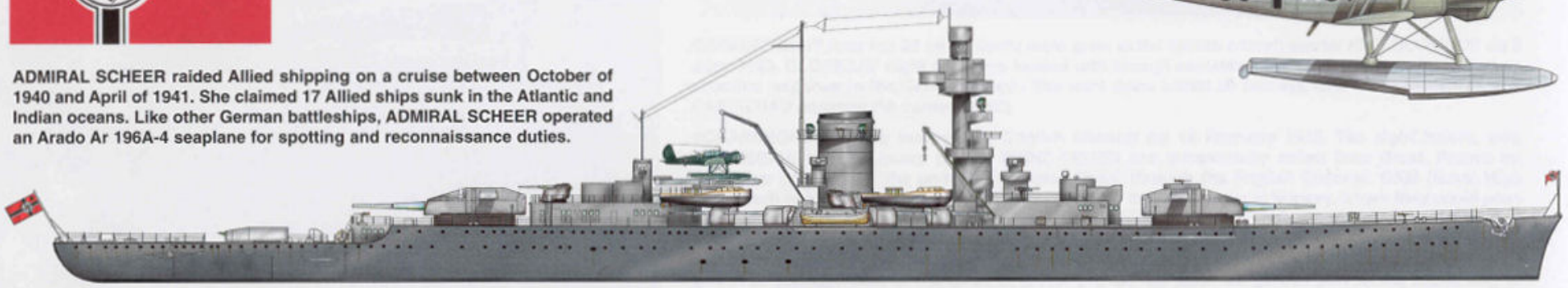
The *Panzerschiff* (Armored Ship) DEUTSCHLAND participated in the Neutrality Patrol off Spain in 1938, during the Spanish Civil War. The ship is painted overall light gray, with turret bands in red, white, and black. A Heinkel He 60C seaplane is embarked for reconnaissance and gunfire spotting duties. DEUTSCHLAND was renamed LÜTZOW on 15 November 1939.

DEUTSCHLAND's Bow Shield (Removed in September of 1939).



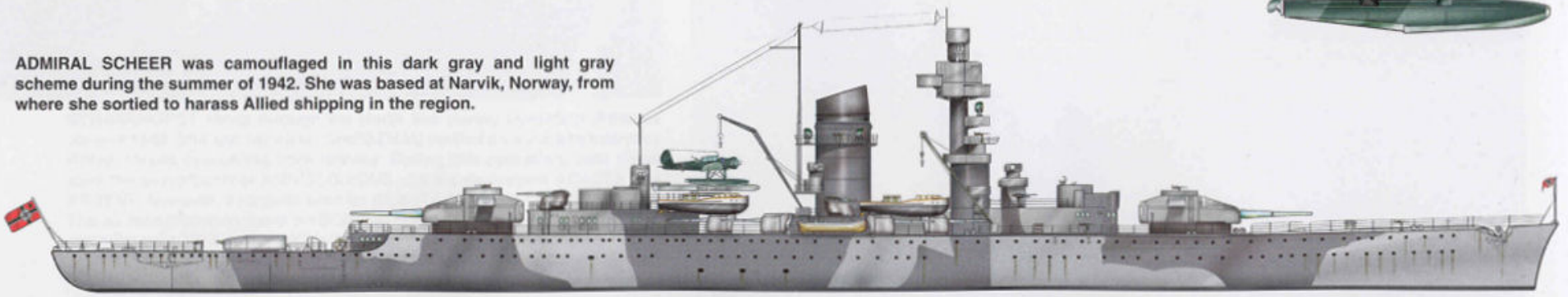
Kriegsmarine Ensign

ADMIRAL SCHEER raided Allied shipping on a cruise between October of 1940 and April of 1941. She claimed 17 Allied ships sunk in the Atlantic and Indian oceans. Like other German battleships, ADMIRAL SCHEER operated an Arado Ar 196A-4 seaplane for spotting and reconnaissance duties.



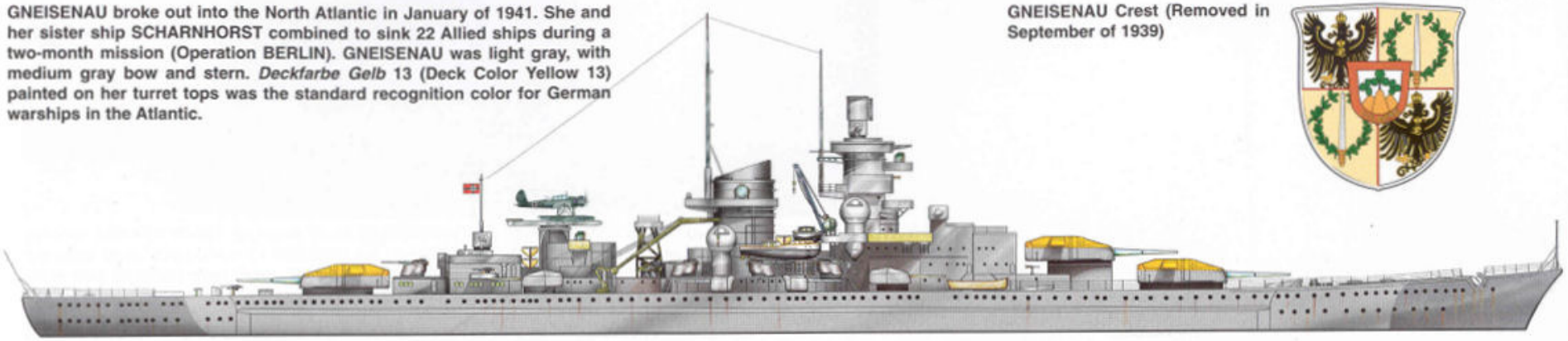
Bordfliegergruppe (Shipboard Group) 196 Insignia

ADMIRAL SCHEER was camouflaged in this dark gray and light gray scheme during the summer of 1942. She was based at Narvik, Norway, from where she sortied to harass Allied shipping in the region.

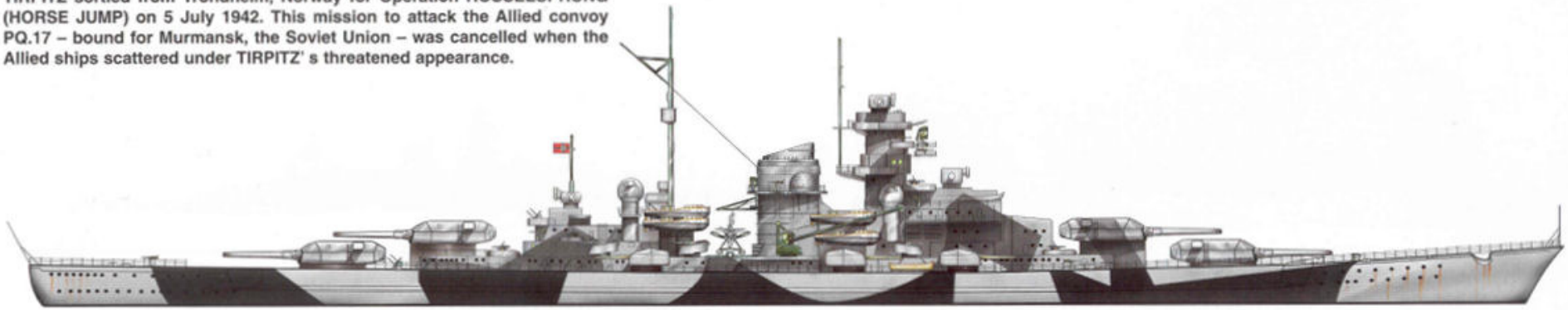


GNEISENAU broke out into the North Atlantic in January of 1941. She and her sister ship SCHARNHORST combined to sink 22 Allied ships during a two-month mission (Operation BERLIN). GNEISENAU was light gray, with medium gray bow and stern. *Deckfarbe Gelb* 13 (Deck Color Yellow 13) painted on her turret tops was the standard recognition color for German warships in the Atlantic.

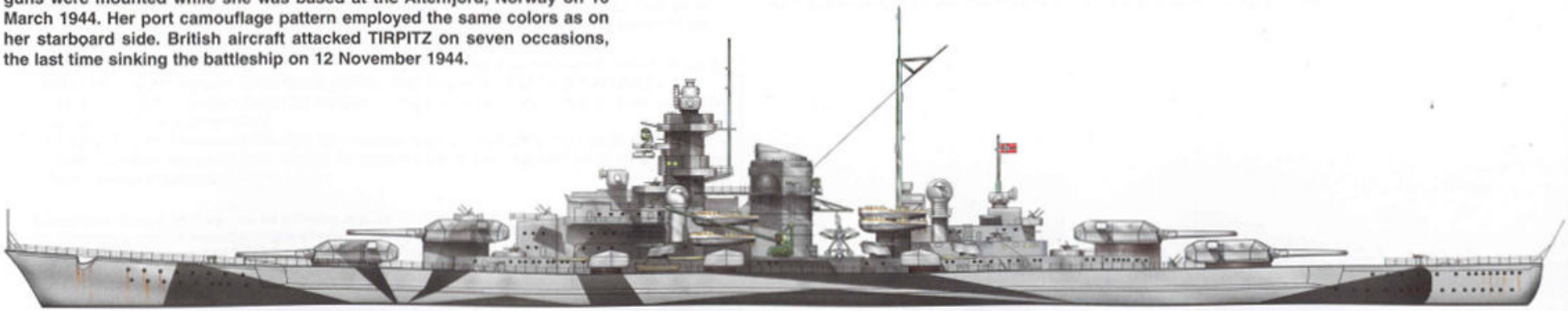
GNEISENAU Crest (Removed in September of 1939)



TIRPITZ sortied from Trondheim, Norway for Operation RÖSSELSPRUNG (HORSE JUMP) on 5 July 1942. This mission to attack the Allied convoy PQ.17 – bound for Murmansk, the Soviet Union – was cancelled when the Allied ships scattered under TIRPITZ' s threatened appearance.



TIRPITZ's superstructure was slightly modified and additional anti-aircraft guns were mounted while she was based at the Altenfjord, Norway on 16 March 1944. Her port camouflage pattern employed the same colors as on her starboard side. British aircraft attacked TIRPITZ on seven occasions, the last time sinking the battleship on 12 November 1944.



(Above) SCHARNHORST (at right) leads GNEISENAU and PRINZ EUGEN up the Dutch coast during the 'Channel Dash' (Operation CERBERUS) on 12 February 1942. Six destroyers accompanied these ships when they departed from Brest. The force was met by 13 torpedo boats during the dash, which escorted the capital ships through the English Channel towards German waters.

(Below) SCHARNHORST steams at high speed in the North Sea along the Dutch coast during Operation CERBERUS. She struck two mines along this stretch. Neither caused serious damage, but it was sufficient to keep SCHARNHORST out of action until October of 1942. The Germans temporarily fitted a 20MM quad mount on B turret for additional anti-aircraft fire during CERBERUS. This mount was removed after the 'Channel Dash.' (*Bundesarchiv*)

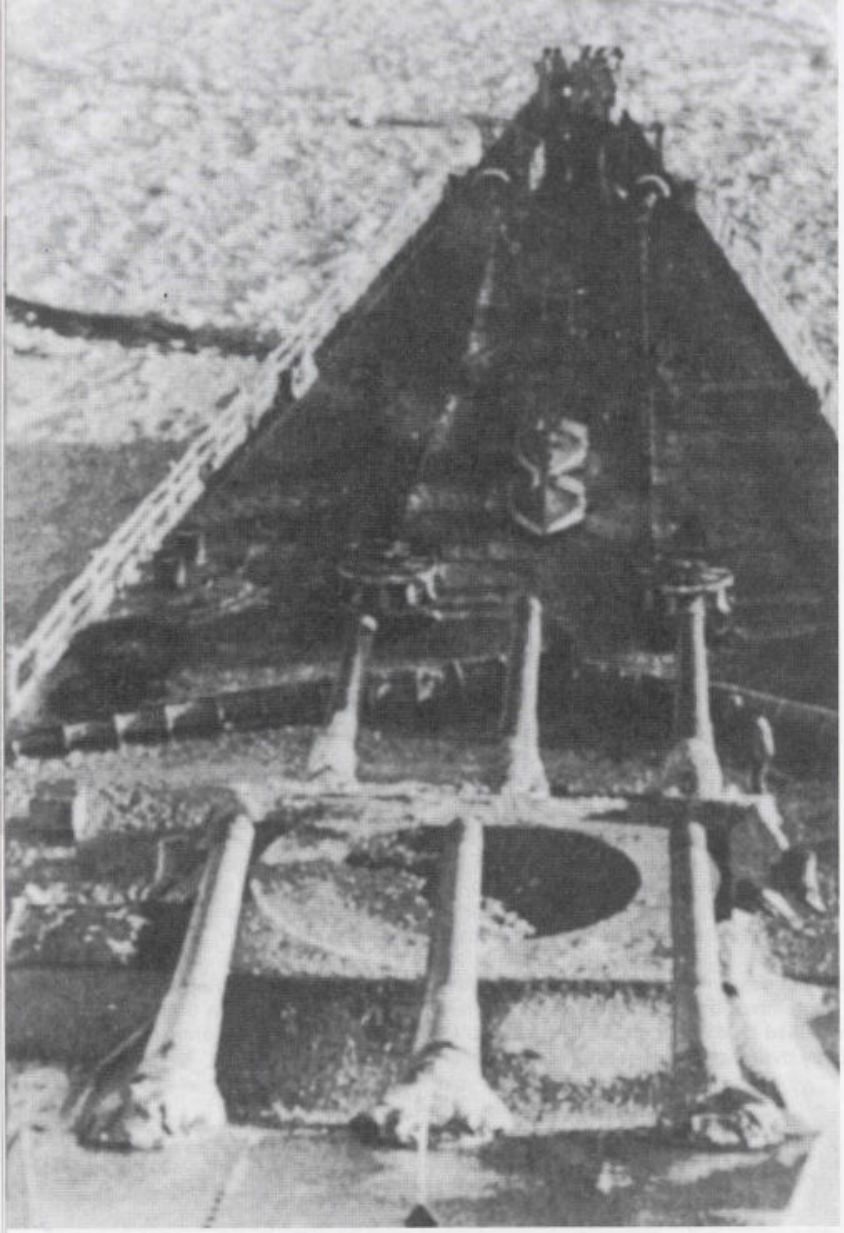
Small escorts lead SCHARNHORST through the English Channel during the 'Channel Dash.' Her 10.5 CM (4.1-inch) anti-aircraft guns are elevated to meet any British aircraft that attacked the German formation. Signal flags are displayed from her mainmast. (*Bundesarchiv*)

SCHARNHORST lies near the battleship TIRPITZ at Altafjord, Norway in early September of 1943. On 6 September, these battleships sailed from Altafjord on Operation SIZILIEN (SICILY) against Allied-held Spitzbergen. SCHARNHORST has a Light Gray bow and stern, with a darker Gray over the rest of her hull and superstructure. (NHC)

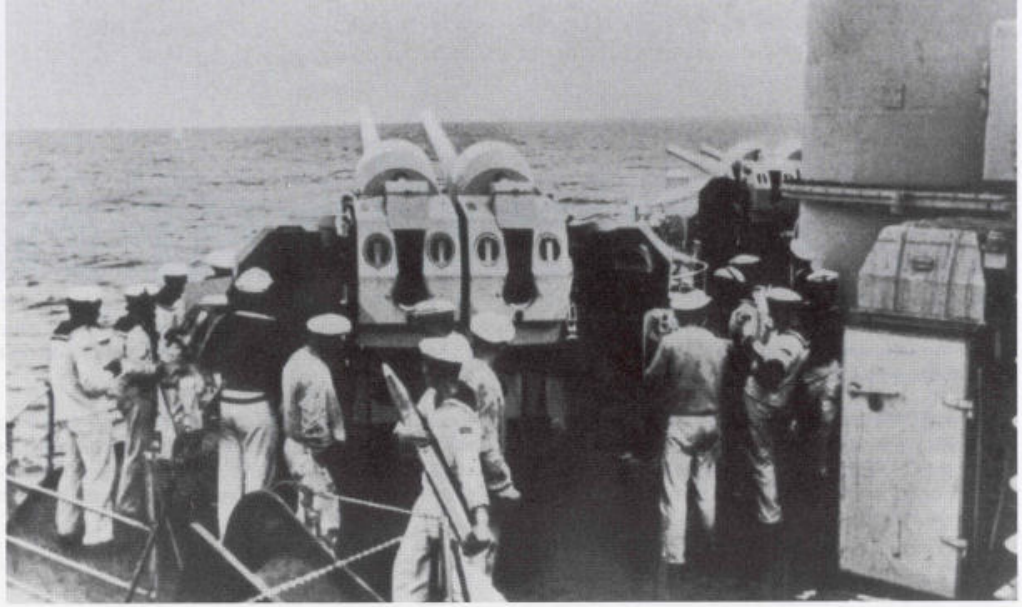
German Warship Colors, World War Two

Schiffstarnfarbe (Ship's Camouflage color) *31$_1$ Hellgrau* (Light Gray) – Superstructure
Schiffstarnfarbe 31$_2$ Dunkelgrau (Dark Gray – Hull (NOTE: This was a Medium Gray that was hard to distinguish from the Light Gray upperworks in certain lighting conditions.)
Schiffsbodenfarbe (Ship's Hull Color) *I 22a Rot* (Red) – Underwater Hull Color
Wasserlinienfarbe (Waterline Color) *I 23a Grau* (Gray) – Waterline color (NOTE: This Dark Gray was indistinguishable from Black in most photographs. This was supposed to be applied 1 M/3.3 feet above and below the standard displacement waterline.)
Deckfarbe (Deck Color) *50 Hellgrau* – Deck Color (NOTE: This was also used on funnel caps.)
Deckfarbe 51 Dunkelgrau – Deck Color (NOTE: This was also used on funnel caps.)
Wasserfarbe (Water-Based Color) *95 Hellgrau* – Pre-war funnel color (NOTE: This color was almost White in appearance.)
Aluminumbronze (Aluminum Bronze) *76* – Funnel Cap Color (NOTE: This semi-reflective Aluminum-colored paint was similar in appearance to the metallic paint often used on fabric-covered aircraft.)

General Note: German ships also carried quantities of Black, White, Red, Yellow, Blue, Green, and Brown tinting colors. These were used as needed to create air recognition panels and one-off camouflage schemes, such as the Green-Brown schemes reported in the Baltic and the Blue-Gray schemes seen in Norwegian waters. The various other Gray colors seen in the Baltic and Norwegian camouflage schemes were not official colors, but were mixed as needed using the two standard Grays mixed with one or more tints.



A SCHARNHORST Class ship – believed to be GNEISENAU – is locked in thick ice during the winter of 1939-40. This ice proved sufficiently thick to support vehicular traffic. The White ring painted on a Dark Gray background atop A (*Anton*) turret was an air recognition symbol. This was identical to such emblems painted on German capital ships late in World War One.



Crewmen serve a twin 10.5 CM (4-inch) SK C/33 anti-aircraft mount on GNEISENAU during a pre-war training exercise in 1938. This ship and SCHARNHORST were each armed with fourteen 10.5 CM guns in seven twin mounts. The SK C/33 had a maximum range of 17,700 M (19,357 yards) and a ceiling of 12,500 M (41,010 feet) at an 80° firing angle. Cylindrical bulges immediately before the breeches housed recoil cylinders. (Via Bob Cressman)

The new GNEISENAU is depicted on a propaganda postcard. The ship is pictured above the lyrics of a German patriotic song, *"Denn wir fahren gegen Engeland!"* ("Then we sail against England!"). During late 1938, GNEISENAU was fitted with a modified 'Atlantic' clipper bow and a tall funnel cap. Unlike her sister SCHARNHORST, GNEISENAU's main mast remained immediately aft of the funnel.

...„denn wir fahren gegen Engeland!"

Heute wollen wir ein Liedlein singen:
Trinken wollen wir den kühlen Wein
und die Gläser sollen dazu klingen,
denn es muß, es muß geschieden sein.

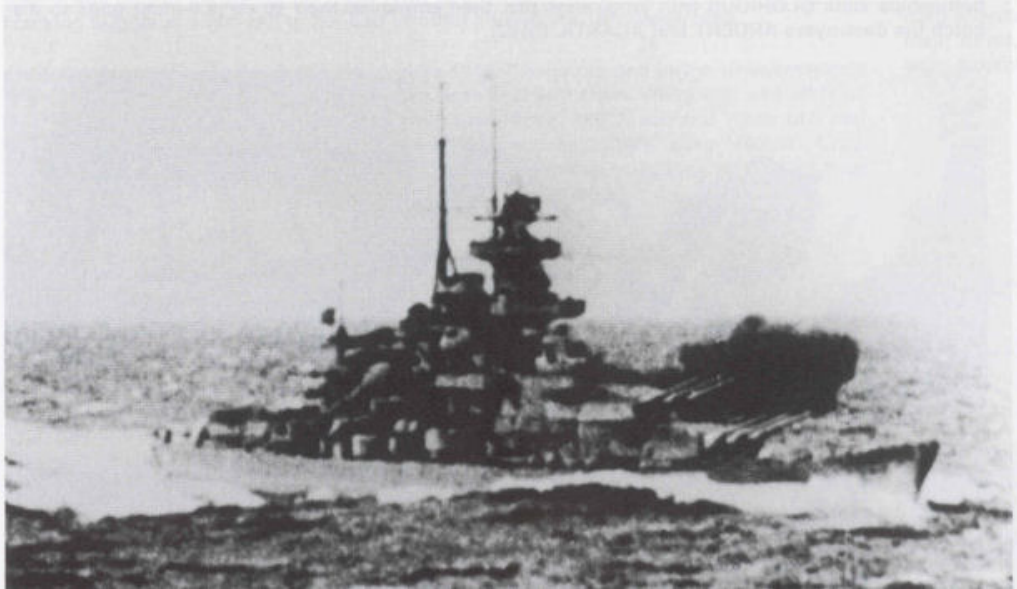
Unser Flagge und die wehet auf dem Maste.
Sie verkündet unsres Reiches Macht;
Denn wir wollen es nicht länger leiden,
daß der Engländschmann darüber lacht.

Kommt die Kunde, daß ich bin gefallen,
Daß ich schlafe in der Meeresflut:
Weine nicht um mich, mein Schatz und denke:
Für das Vaterland, da floss sein Blut.

Gib mir deine Hand, deine weiße Hand,
leb wohl, mein Schatz,
leb wohl, mein Schatz, leb wohl.
Lebe wohl, denn wir fahren, denn wir fahren,
denn wir fahren gegen Engeland, Engeland!

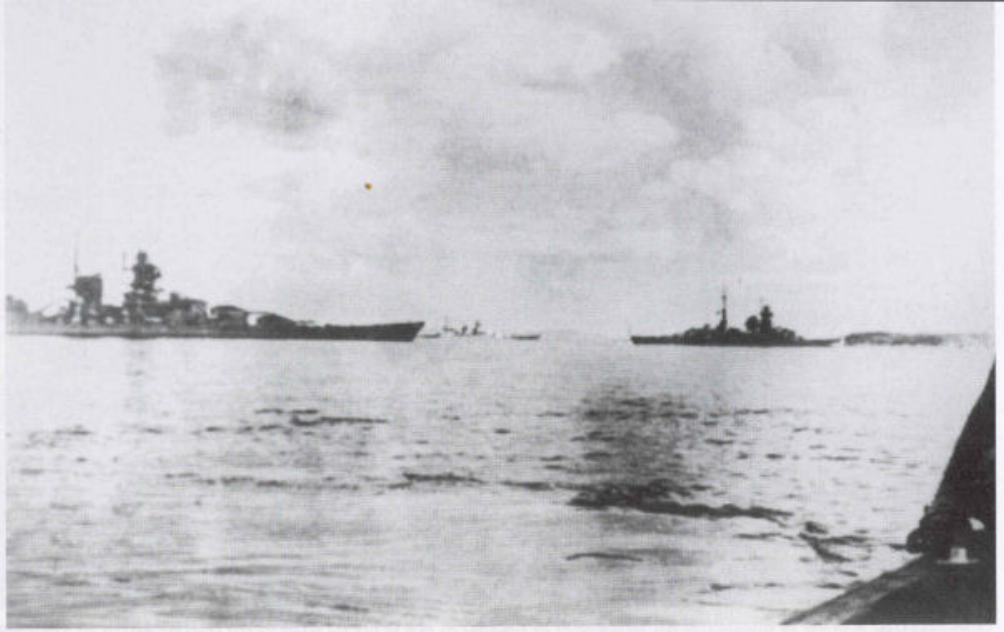
GNEISENAU's crew is mustered aft while she is locked in ice prior to Operation NORDMARK in February of 1940. An Arado Ar 196 floatplane is spotted on her amidships catapult, but no aircraft is located on GNEISENAU's aft turret catapult. The latter catapult was not employed early in World War Two and was removed from the ship by 1942. (*Bundesarchiv*)

Smoke erupts from the three 28 CM guns of GNEISENAU's B turret while she engaged the British aircraft carrier HMS GLORIOUS on 8 June 1940. GNEISENAU and SCHARNHORST departed German waters four days before on Operation JUNO, whose objective was to find and destroy retreating British forces in Norwegian waters. The Germans sank GLORIOUS and the destroyers ACASTA and ARDENT before putting into Trondheim, Norway on 9 June. (NHC)



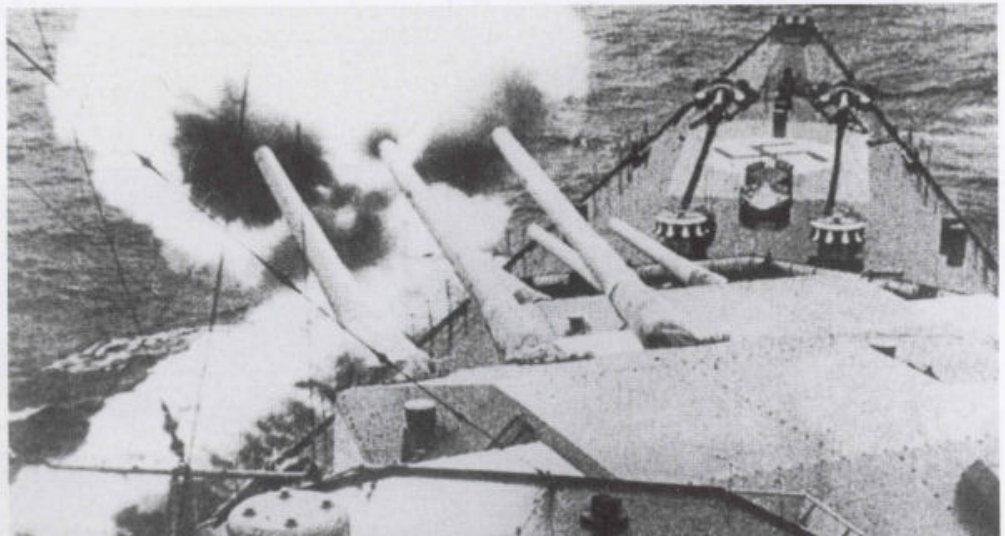
GNEISENAU (in the far background) and a destroyer cut through sheet ice astern of SCHARNHORST in February of 1940. These warships, along with the heavy cruiser ADMIRAL HIPPER, were deployed on Operation NORDMARK. This was intended to raid Allied merchant convoys off the Norwegian coast; however, a lack of targets terminated this mission. One of SCHARNHORST's spherical anti-aircraft directors is mounted above some of her starboard secondary guns. (*Bundesarchiv*)

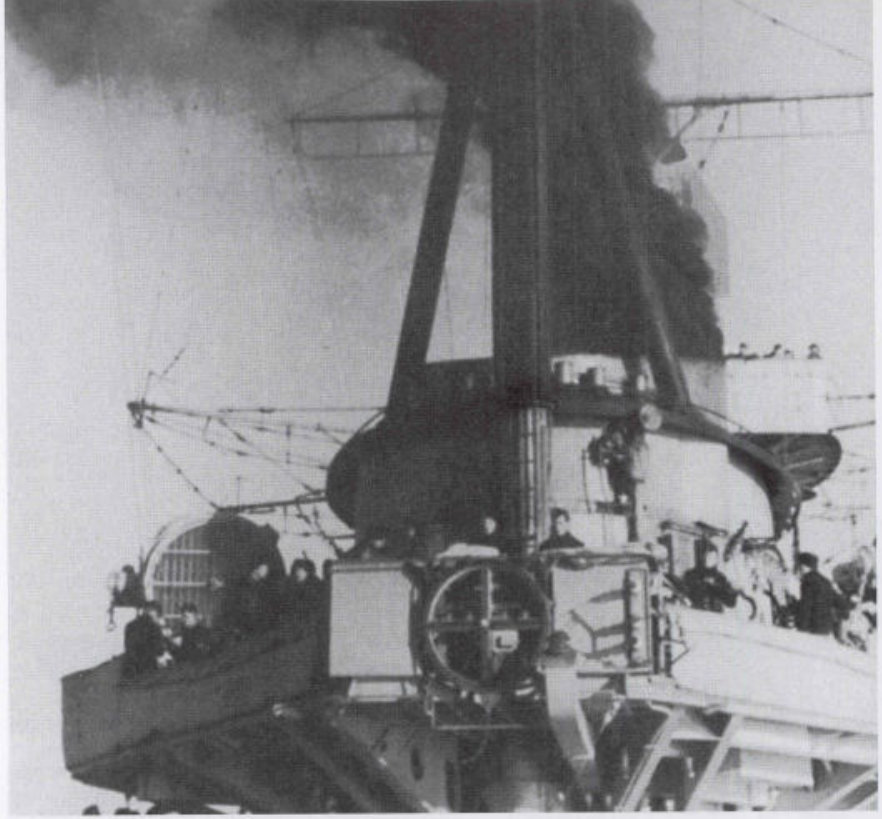
GNEISENAU's bow cuts through the North Sea during Operation JUNO in June of 1940. Main turret upper surfaces were painted dark gray and the old White ring aircraft recognition insignia was removed. This insignia was replaced with a representation of the German flag – Red with a Black swastika on a White disc – on the bow. The orthochromatic film makes the Red background hard to distinguish from the deck. (*Bundesarchiv*)



The major fleet units assigned to Operation JUNO assembled at Kielerförde, Germany in early June of 1940. GNEISENAU is anchored at left, with SCHARNHORST off her port bow and the heavy cruiser ADMIRAL HIPPER on the right. These ships and their escorting destroyers departed Kielerförde on 4 June and passed through the Skagerrak before entering the North Sea. (NHC)

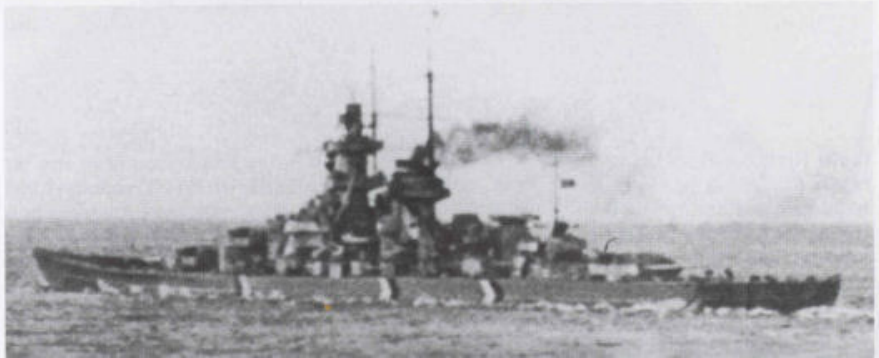
Guns from GNEISENAU's B turret fire at long range at HMS GLORIOUS on 8 June 1940. The German battleships sank GLORIOUS with long-range fire, then employed their 15 cm (5.9-inch) guns to dispatch the destroyers ARDENT and ACASTA. (NHC)

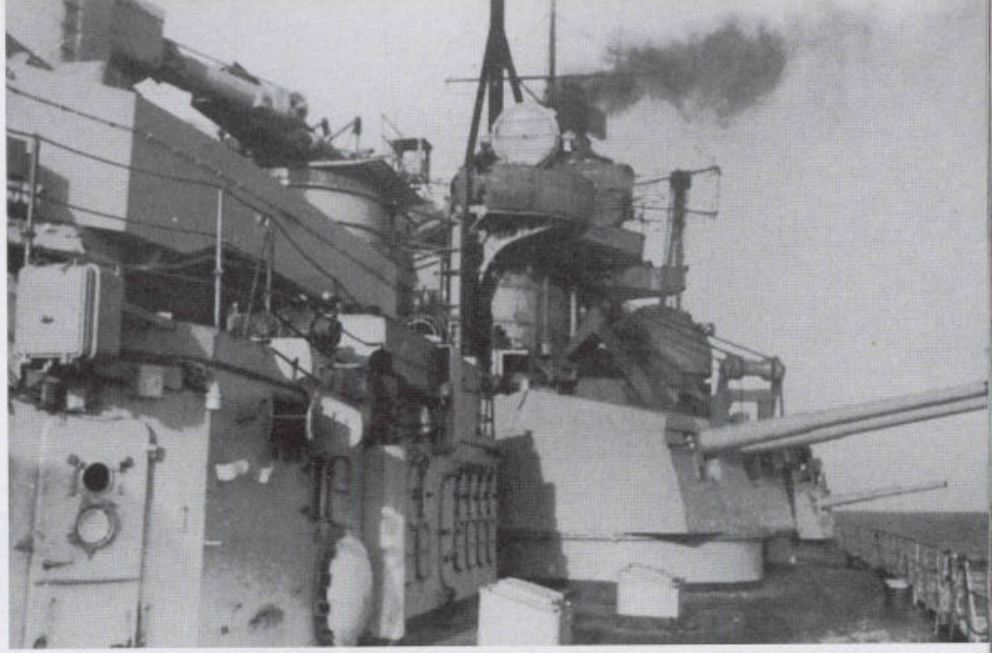




Sailors man the searchlight platform mounted on GNEISENAU's funnel. Her mainmast remained immediately aft of the funnel, unlike the mast on her sister SCHARNHORST, which was moved aft during her 1939 refit. Searchlights were employed for finding and tracking targets at night and under bad weather conditions. (*Bundesarchiv*)

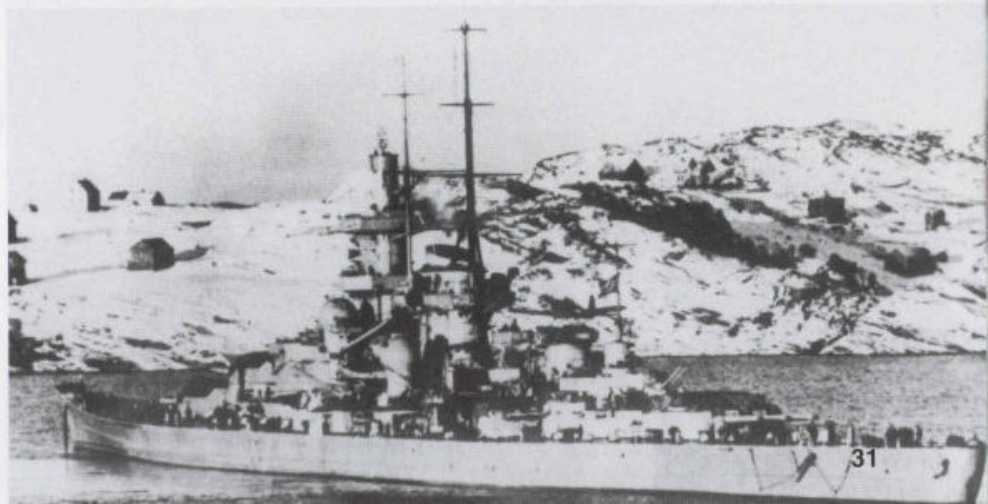
GNEISENAU steams in the Baltic Sea in late 1940. She is painted in the *Kriegsmarine*'s Baltic color scheme, which included a Dark Gray bow and stern, White fore and aft false bow waves, *Deckfarbe Rot* (Deck Color Red) turret tops, and Black and White hull and superstructure bands. The rest of the hull and superstructure were Medium Gray. GNEISENAU and her sister SCHARNHORST wore this scheme while they worked up prior to Operation BERLIN in January of 1941. (Via Bob Cressman)





GNEISENAU's aft starboard 15 CM (5.9-inch) turret is swung out while the battleship is at sea. One of her single 15 CM guns is also trained towards the starboard aft quarter. These weapons were primarily employed to save wear on the larger 28 CM (11-inch) main guns. (*Bundesarchiv*)

GNEISENAU lies at anchor in a Norwegian fjord early in Operation BERLIN in January of 1941. Like SCHARNHORST, she was repainted from the Baltic scheme worn during her working up period. Black and White hull and superstructure bands were overpainted and the Dark Gray bow and stern sections repainted Medium Gray. Main turret tops were repainted *Deckfarbe Gelb 13* (Deck Color Yellow 13), which was the *Kriegsmarine*'s standard Atlantic recognition color. The aircraft catapult was removed from atop her C (*Cäsar*) main turret. GNEISENAU and SCHARNHORST each carried up to three aircraft, which were employed for reconnaissance and artillery spotting. (NHC)

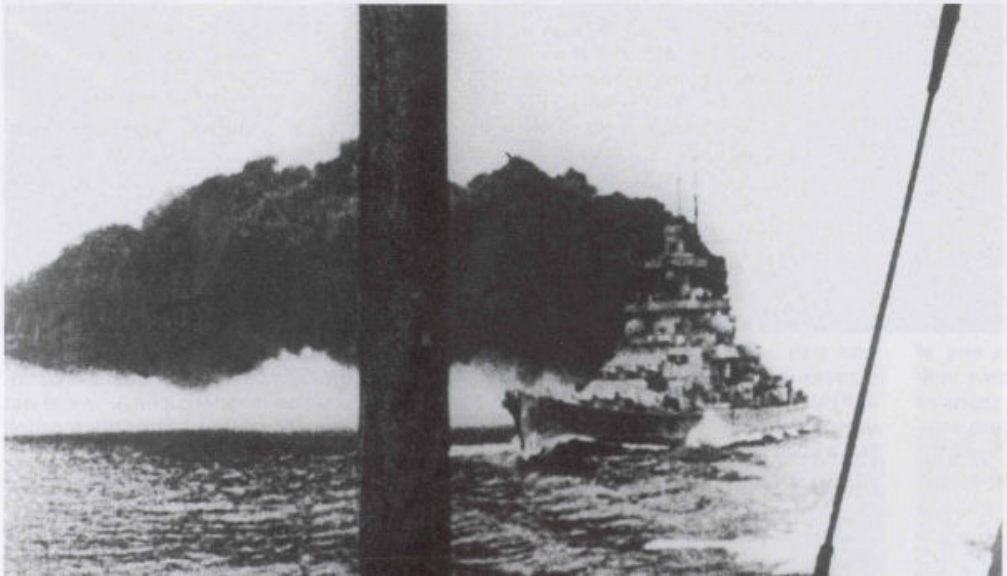


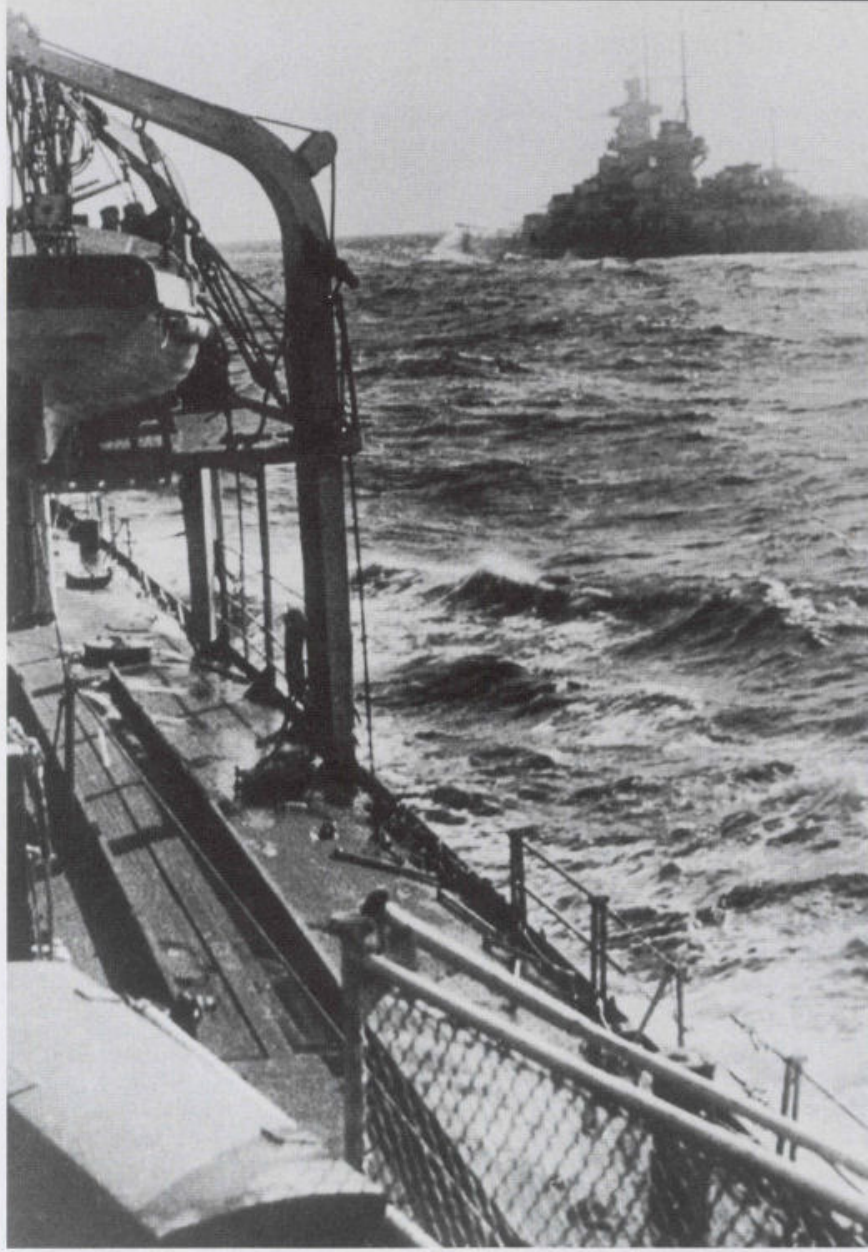
(Above) GNEISENAU rides through a North Atlantic swell during Operation BERLIN. She and SCHARNHORST attempted an earlier breakout into the Atlantic on 28 December 1940, but heavy seas caused damage to GNEISENAU, forcing both ships back to Germany on 3 January 1941. On 22 January, both battleships successfully slipped into the North Atlantic. *Admiral* Günther Lütjens, commander of the *Flottenstreitkräfte* (High Seas Fleet), flew his flag from GNEISENAU during BERLIN. (*Bundesarchiv*)

(Left) Rime ice from frost conditions coats GNEISENAU while she operated in the far North Atlantic in late January of 1941. GNEISENAU and SCHARNHORST sailed 17,800 nautical miles during Operation BERLIN from 22 January to 23 March, when they put into Brest, France. They combined to sink 22 Allied merchant ships of 115,000 tons during this mission. (*Bundesarchiv*)

Sailors chip rime ice from hatches on GNEISENAU's A main turret during Operation BERLIN. This thin ice coating did not affect the ship's stability, but it was necessary to remove it from hatches, including the doors that covered the main battery turret rangefinder optics. A 20MM *Flak* 38 cannot is mounted atop this turret. (*Bundesarchiv*)

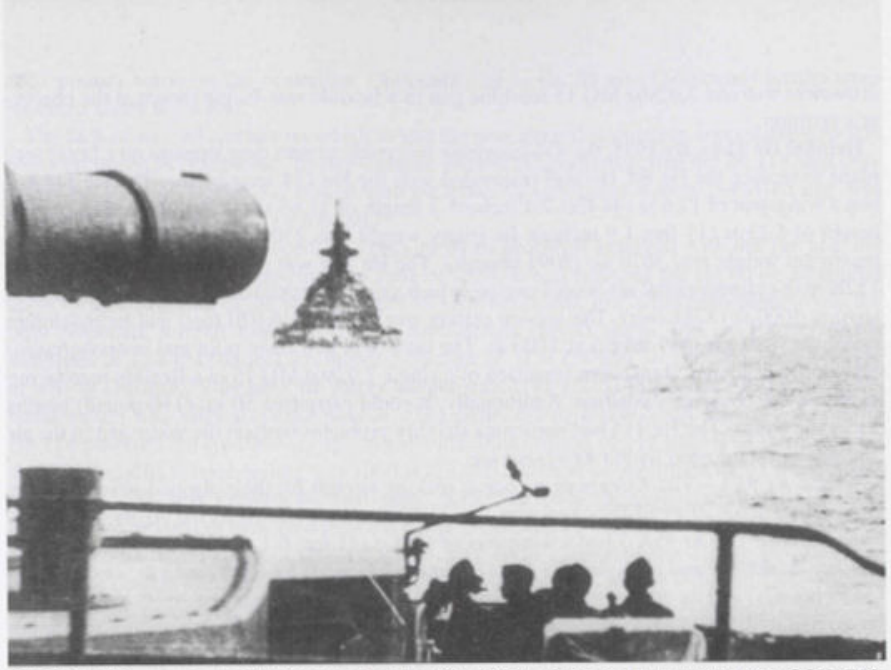
GNEISENAU deploys a smoke screen while evading the British battleship HMS RODNEY on 16 March 1941. The German battleship was picking up survivors from a freighter she had sunk when RODNEY appeared in the area. Both GNEISENAU and SCHARNHORST were outgunned by RODNEY's nine 16-inch (40.6 CM) guns, but were able to use their superior speed and the smoke screen to escape undamaged. (NHC)





GNEISENAU steams towards Brest at the end of Operation BERLIN on 22 March 1941. She and SCHARNHORST combined to sink 22 Allied merchant ships during this two-month long mission. One of the torpedo boats deployed to meet these battleships steams to GNEISENAU's port quarter. German torpedo boats were larger than *Schnellboote* (S boats), the German motor torpedo boats. (*Bundesarchiv*)

All available naval brass welcome GNEISENAU as she arrives at Brest at the end of Operation BERLIN on 22 March 1941. Pennants flying from her foremast yardarms indicate the merchant ships sunk and their tonnage. GNEISENAU sank 11 ships and captured three others for a combined tonnage of 66,500 tons. Her Medium Gray bow and stern camouflage faded to the point of ineffectiveness. A degaussing coil ran from the aft anchor hawsepipe forward along the upper edge of the armor belt. This electrically charged cable was part of her *Magnetischer Eigenschutz* (MES: Magnetic Self-Protection System). Current that ran through this coil created a magnetic field opposite to the ship's magnetic field, reducing that field to the point that devices such as magnetic mines would not detect the ship. It was installed during GNEISENAU's refit at Kiel from July through November of 1940. (*Bundesarchiv*)



GNEISENAU moves north through the English Channel on 12 February 1942. SCHARNHORST is just visible aft of her sister. Operation CERBERUS was the German attempt to redeploy their capital ships from Brest, where they were increasingly vulnerable to British Royal Air Force (RAF) attacks. (NHC)

GNEISENAU maneuvers at high speed during an unsuccessful attack by Royal Navy Motor Torpedo Boats (MTBs) from Dover and Ramsgate, England. This was the first serious British reaction to Operation CERBERUS. Two waves of British aircraft sank a German coastal patrol boat, but could not stop the capital ships. GNEISENAU struck a mine off the Dutch coast on the evening of 12 February, but reached Kiel the next day. (NHC)

GNEISENAU steams to starboard of SCHARNHORST during Operation CERBERUS. The German ships were approaching the Straits of Dover when the British first noticed this 'Channel Dash.' Surprise and low overcast skies aided the Germans in CERBERUS. Patches of heavy fog reduced aircraft effectiveness to near zero. (NHC)

A large RAF bomb hit GNEISENAU's foredeck while docked in Kiel on 26 February 1942. Extensive damage from this attack prompted the *Kriegsmarine* to plan to rebuild her with an 10.1 M (33 foot 1.6 inch) extended bow. Her main battery would be upgraded to six 38 CM (15-inch) guns in three twin turrets identical to those of the BISMARCK Class. GNEISENAU was towed to Gotenhafen (now Gdynia, Poland) and her old bow and turrets were removed, but work was suspended at the beginning of 1943. She was scuttled to block the harbor on 27 March 1945. (Via Bob Cressman)

Shipboard Aircraft

All three classes of *Kriegsmarine* capital ships were designed to carry onboard aircraft. When aircraft catapults were first fitted on large warships in the early 1930s, the aircraft's main roles were short-range reconnaissance and shell spotting. The idea was that small floatplanes would be launched when enemy forces were thought to be near. They would find the enemy, direct friendly forces into advantageous positions, spot gunfire during the resulting battle, and prevent enemy floatplanes from doing the same service for the other side. When the battle was over or the aircraft ran low on fuel, they would land on the water near friendly ships and wait to be recovered.

The emergence of aircraft carriers brought aircraft to the battle with a huge performance advantage over any floatplane and necessitated changes in the role of shipboard floatplanes. While the utility of shipboard aircraft over a naval battle declined, they were given a long-range reconnaissance role that was of particular value to a commerce raider.

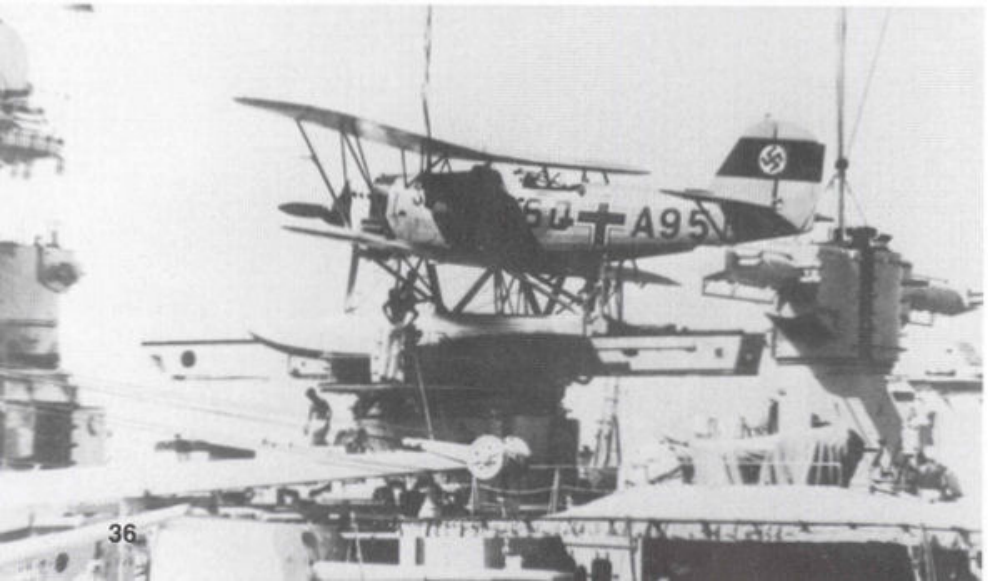
German capital ships embarked four aircraft types:

Heinkel He 60C – The C variant of the He 60 biplane first flew in 1934. The *Kriegsmarine* soon adopted it as the standard shipboard floatplane. This model had a wingspan of 12.92 M (42 feet 4.7 inches), a length of 11.5 M (37 feet 8.8 inches) and a height of 4.94 M (16 feet 2.5 inches). Empty weight was 2410 KG (5313 pounds) and maximum weight was 3556 KG (7840 pounds). A 660 HP liquid-cooled BMW VI6,0 ZU 12-cylinder inline, liquid-cooled engine gave the He 60C a maximum speed of 225 KMH (140 MPH) at 1000 M (3281 feet). The service ceiling was 5000 M (16,404 feet), while its maximum range was 769 KM (478 miles) at 2000 M (6562 feet). Its two-man crew consisted of a pilot and observer/radio-operator/rear-gunner. The armament was one 7.92MM MG 15 machine gun in a flexible rear-facing mount at the observer's position.

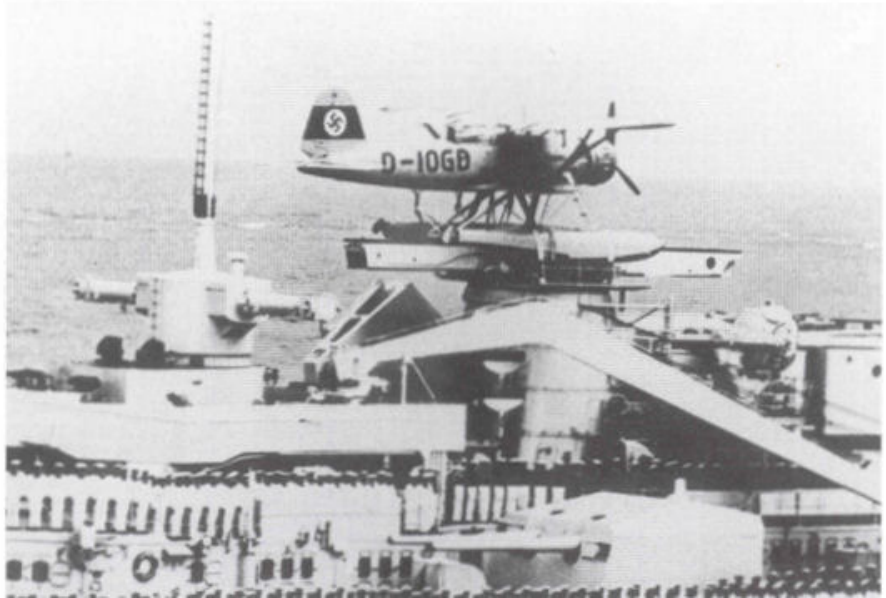
Heinkel He 114 – By 1935, the *Kriegsmarine* was ready to start development on a faster seaplane to replace the He 60. Heinkel responded with the He 114 sesquiplane. The He 114A-2 had a wingspan of 13.6 M (44 feet 7.4 inches), a length of 11.65 M (38 feet 2.7 inches), and a height of 5.23 M (17 feet 1.9 inches). Its empty weight was 2300 KG (5071 pounds) and the maximum weight was 3670 KG (8091 pounds). The He 114 was powered by a 960 HP BMW 132K nine-cylinder radial air-cooled engine, which gave it a maximum speed of 335 KMH (208 MPH) at 1000 M (3281 feet). The service ceiling was 4898 M (16,070 feet) and its maximum range was 880 KM (547 miles) at 1000 M. The crew was two men: pilot and observer/radio-operator/rear-gunner. Armament consisted of a single 7.92MM MG 15 in a flexible rear-facing mount at the observer's position. Additionally, it could carry two 50 KG (110 pound) bombs under the wings. The He 114 had numerous stability problems both on the water and in the air and was never adopted by the *Kriegsmarine*.

Arado Ar 95A – The *Kriegsmarine* began seeking aircraft for their planned aircraft carrier right after GRAF ZEPPELIN's keel was laid in 1936. Arado produced the Ar 95, a folding-wing biplane. The Ar 95A-1 had a wingspan of 12.5 M (41 feet 0.1 inches), a length of 11.1 M (36 feet 5 inches), and a height of 5.2 M (17 feet 0.7 inches). Its empty weight was 2535 KG (5589 pounds) and its maximum weight was 3556 KG (7840 pounds). The Ar 95 was powered by an 880 HP BMW 135Dc nine-cylinder radial air-cooled engine, which gave it a maximum speed of 301 KMH (187 MPH) at 3000 M (9843 feet). The service ceiling was 7300 M (23,950 feet) and its maximum range was 1094 KM (680 miles) at 1000 M. Its two-man crew was a pilot and an observer/radio-operator/rear-gunner. The Ar 95 was armed with one fixed forward-firing 7.92MM MG 17 and one 7.92MM MG 15 in a flexible rear-facing mount at the observer's position. Its primary offensive weapon was one 698.5 KG (1540 pound) torpedo or one 375 KG

The Heinkel He 60C biplane was slow, but it was stable both in the air and on the water. It was also most forgiving to pilot errors and was a favorite of German pilots. This He 60C (60+A95) was assigned to *Bordfliegergruppe* (Shipboard Group) 196 and is deployed to ADMIRAL SCHEER before World War Two. This aircraft is painted overall RLM 63 Light Gray (FS36373), with RLM 01 Silver (FS17178) floats.



The Heinkel He114 was considered as a replacement for the venerable He 60. It failed to live up to expectations and had only a brief career at sea on German capital ships. The third prototype He 114 (D-IOGB) is spotted on GNEISENAU's amidships catapult during a pre-war naval review. A Black swastika on a White disc is painted on the Red tail band.

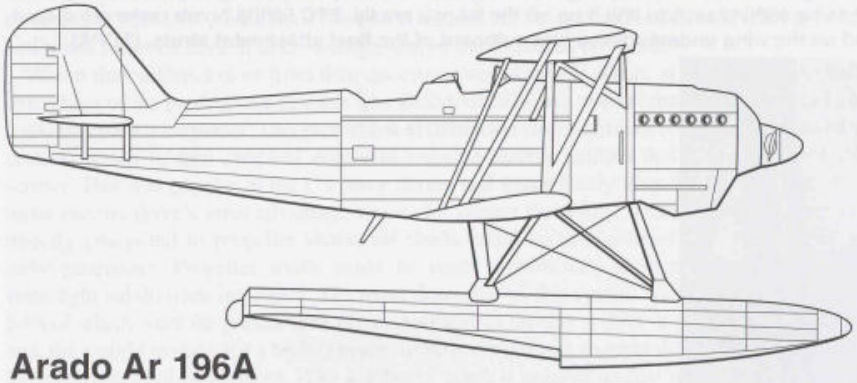


(827 pound) bomb on the centerline. Optionally, up to six 50 KG (110-pound) bombs were mounted under the wings.

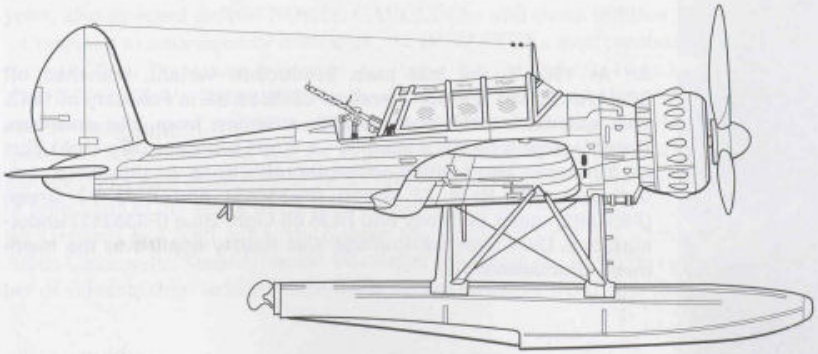
The lack of aircraft carriers on which to test the new aircraft resulted in several early Ar 95s being produced as floatplanes. Its performance proved disappointing, like the He 114, and only a few Ar 95s saw service on capital ship catapults. It was never widely deployed and was replaced before World War Two began.

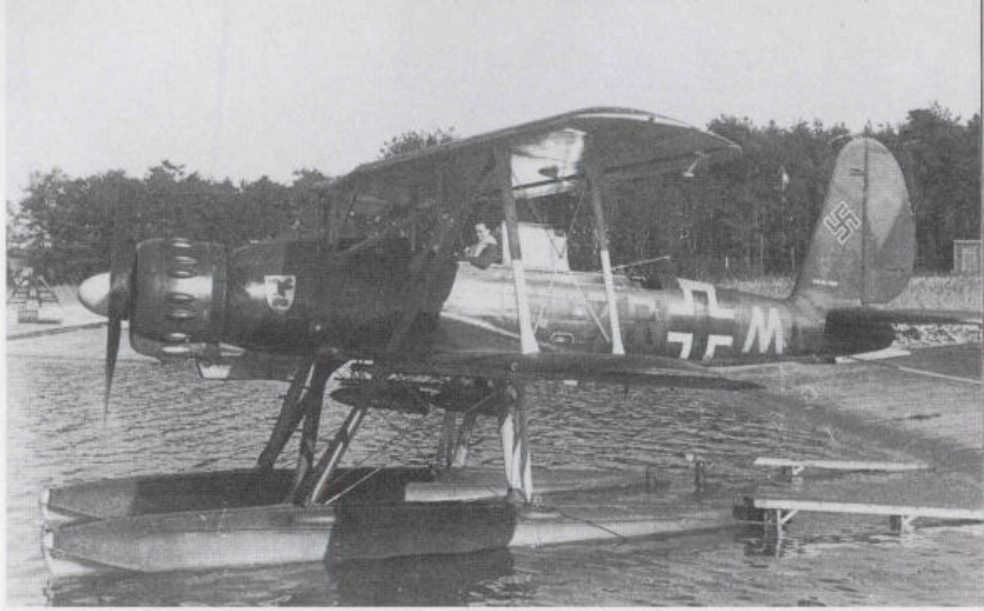
Arado Ar 196A – Developed as a backup when problems emerged with the He 114, the Ar 196A was ready for deployment in June of 1939. It had replaced the He 60 on all capital ships by the beginning of the war. The Ar 196A – a twin-float, low-wing monoplane – was the only shipboard aircraft that saw combat off German capital ships. The Ar 196A-3 had a wingspan of 12.44 M (40 feet 9.8 inches), a length of 11 M (36 feet 10.7 inches), and a height of 4.45 M (14 feet 7.2 inches). Its empty weight was 2335 KG (5148 pounds), while its maximum weight was 3303 KG (7282 pounds). The same 960 HP BMW 132K engine used on the He 114 powered the Ar 196A-3, which had a maximum speed of 312 KMH (194 MPH) at 1000 M (3281 feet). Its service ceiling was 7000 M (22,966 feet) and its maximum range was 800 KM (497 miles). It was crewed by two men: pilot and observer/radio-operator/rear-gunner. Armament consisted of two fixed forward-firing 20MM MG FF cannon, a single fixed forward-firing 7.92MM MG 17, and a single 7.92MM MG 15 in a flexible rear-facing mount at the observer's position. It also carried two 50 KG SC 50 bombs under the wings in ETC 50/VIII racks. Ar 196 production went through A-1 through A-3 variants with no external differences between them.

Heinkel He 60C



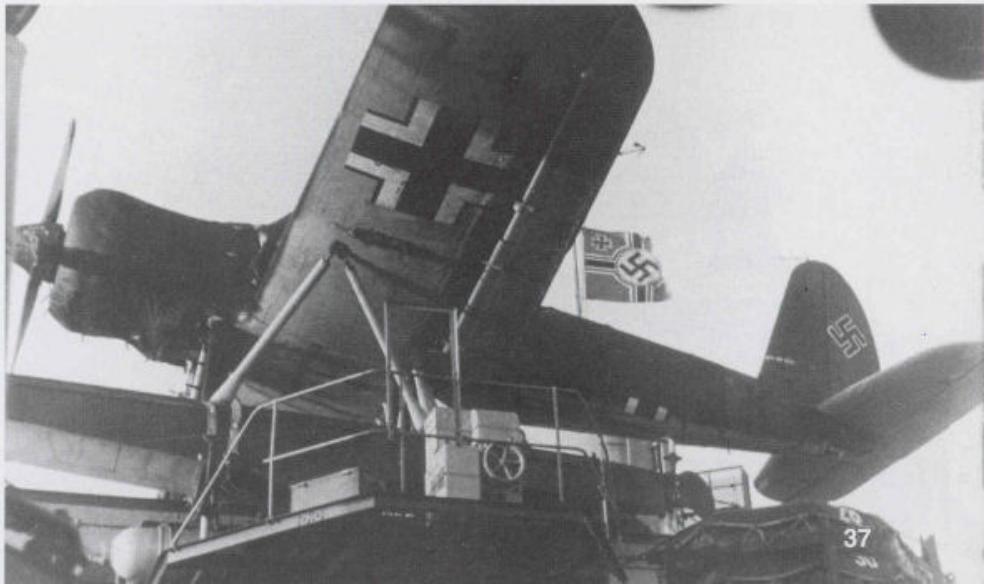
Arado Ar 196A



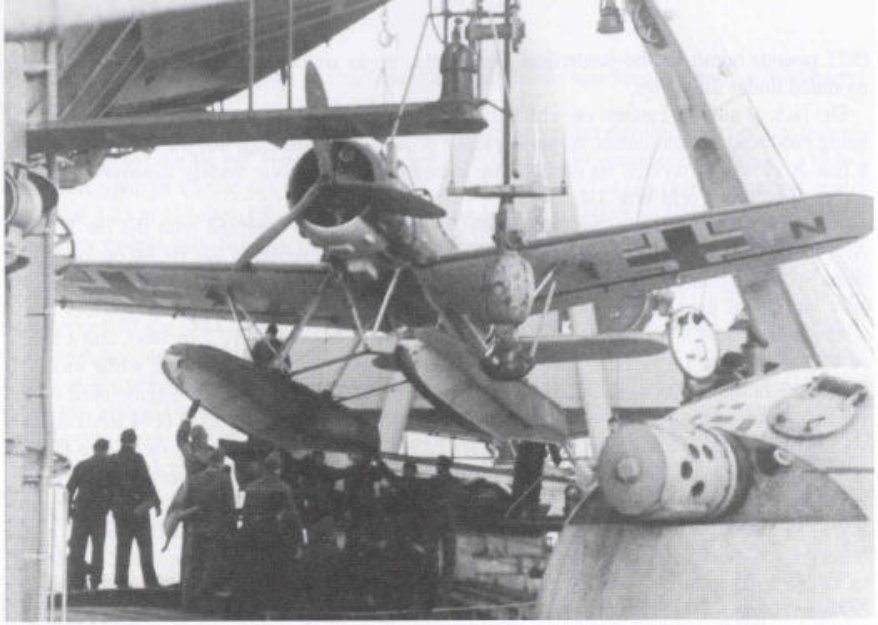


Like the He 114, the Arado Ar 95 was destined for a brief career aboard *Kriegsmarine* capital ships. The aircraft's performance did not justify extensive production and deployment. This Ar 95A-1 (7R+ML) was assigned to 3. *Staffel* (Squadron)/*See Aufklärungsgruppe* (SAGr; Sea Reconnaissance Group) 125 in the Baltic in 1941. (*Bundesarchiv*)

An Arado Ar 196A-4 (T3+EK) sits on ADMIRAL SCHEER's catapult sometime in 1940-41. This aircraft was assigned to *Bordfliegergruppe* 196, which provided detachments for the German capital ships. A canvas cover protected the engine from corrosive saltwater spray. Numbered liferafts are neatly stacked to starboard of the catapult. The mattress-type antenna of the aft *Seetakt* radar is seen above these liferafts and just under the Ar 196A-4's aft fuselage. (NHC)



This same Ar 196A-4 (T3+EK) is launched from ADMIRAL SCHEER's catapult. This aircraft was deployed to seek targets in the calm South Atlantic. Its flaps were fully lowered for launch. The launch cradle ran to the end of the catapult. The Ar 196 was a faster aircraft than the He 60C and proved well suited for shipboard operations. (NHC)



An Ar 196A-1 is hoisted onto SCHARNHORST's catapult in April of 1940. The aircraft had just returned to the ship from a reconnaissance mission. Seamen stood atop the curved, sliding roof of the aircraft hanger aft of the funnel. They were ready to grab the aircraft as it came within reach to line it up on the launch cradle. ETC 50/VIII bomb racks are mounted on the wing undersurfaces just outboard of the float attachment struts. (ECPA)

An Ar 196A-3, the last main production variant, launches off SCHARNHORST during Operation CERBERUS in February of 1942. This event attracted considerable attention from idle crewmen. *Bordfliegergruppe* 196's insignia – a White seahorse on a Light Blue background – was painted on the aircraft's nose. Ar 196s were camouflaged with RLM 72 Green (FS34085) and RLM 73 Green (FS34092) upper surfaces and RLM 65 Light Blue (FS35352) undersurfaces. Dark Gray camouflage was hastily applied to the mainmast. (*Bundesarchiv*)

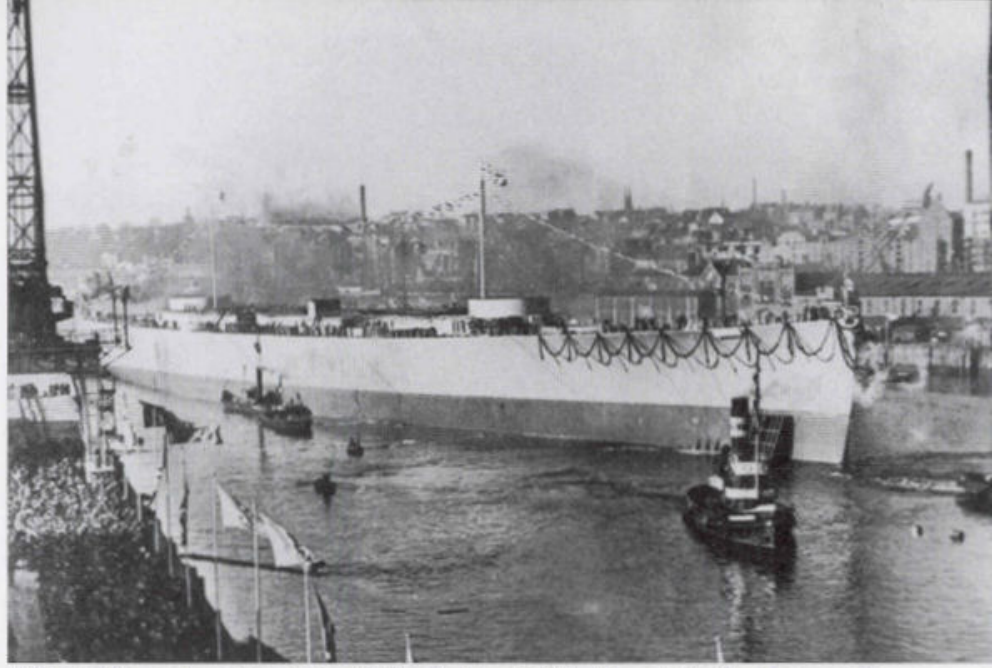
BISMARCK Class

The newly signed 1935 Anglo-German Naval Agreement legitimized the SCHARNHORST Class. Additionally, it allowed Germany to build a pair of true battleships to replace two pre-Dreadnoughts still in service. (This agreement, which also allowed the Germans to possess submarines, simply ignored the fact that the 1919 Versailles Treaty denied Germany both battleships and submarines.) The 1935 accord limited the new battleships' displacement to 35,000 tons, the same nominal displacement to which new British and American battleships were being designed. For all intents, German designers ignored these limits from the beginning of the design process. An addendum to the Naval Agreement signed in 1938 set the maximum battleship tonnage at 45,000 tons, which was just as well, as the designed displacement had already exceeded the older limit by thousands of tons. The *Kriegsmarine* ordered BISMARCK in 1935 and commissioned her on 24 August 1940. TIRPITZ was authorized in 1936 and commissioned on 25 February 1941. BISMARCK and TIRPITZ each had a standard displacement of over 41,000 tons and a full load displacement of over 51,000 tons when completed. (To put this size in perspective, the only larger battleships actually completed were the four American IOWAs, the two Japanese YAMATOs, and the post-war British VANGUARD.)

The BISMARCKs were to be real battleships by any definition of the term. The designs were direct derivatives of the late-World War One BADEN Class battleships and the never-completed ERSATZ YORCK Class battlecruisers. Like those ships, they were designed to carry the same main armament of eight 38 CM (15-inch) guns in four twin turrets and similar armor thickness of 320MM (12.6 inches). The BISMARCKs did share with the SCHARNHORSTs the additional armored deck in acknowledgement of the increased air threat.

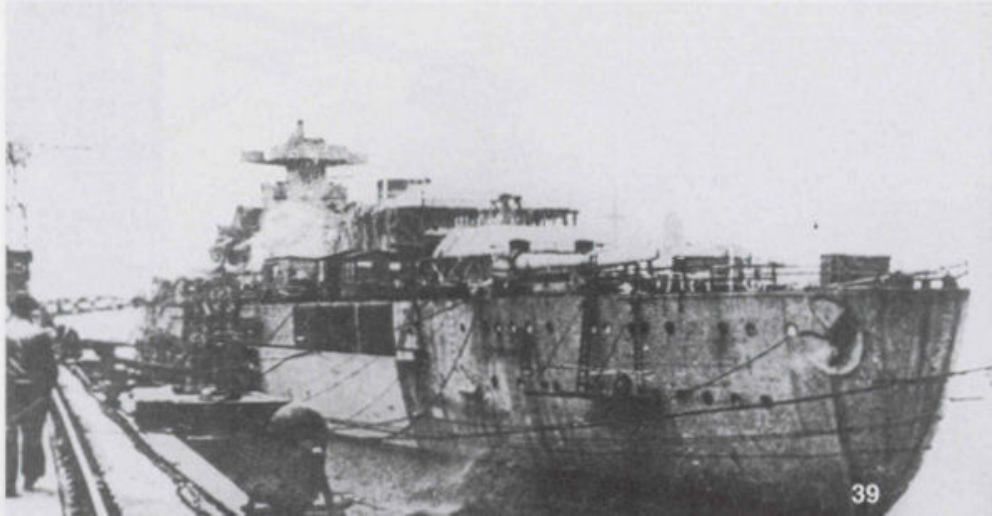
Where they differed most from their ancestors was in speed, which, at 29 knots, was faster than either of the predecessor designs. The BISMARCK Class was originally designed to have turbo-electric powerplants. This propulsion system used steam turbines to drive electrical generators, which in turn supplied power to massive electric motors that actually turned the screws. This was popular in the US Navy during and immediately after World War One. The turbo-electric drive's great advantage was its far greater flexibility; because turbines were not directly connected to propeller shafts, all shafts could be driven from any combination of turbo-generators. Propeller shafts could be made significantly shorter and corresponding watertight subdivision improved. The main downside of this system was its size and weight, both of which were far greater than for a conventional turbine system of similar power. In the end, the weight savings for a high-pressure turbine system was so great that the Germans opted for a conventional powerplant. (The US Navy, when it ordered its first new battleships in 20 years, also designed the two NORTH CAROLINAs with steam turbines.)

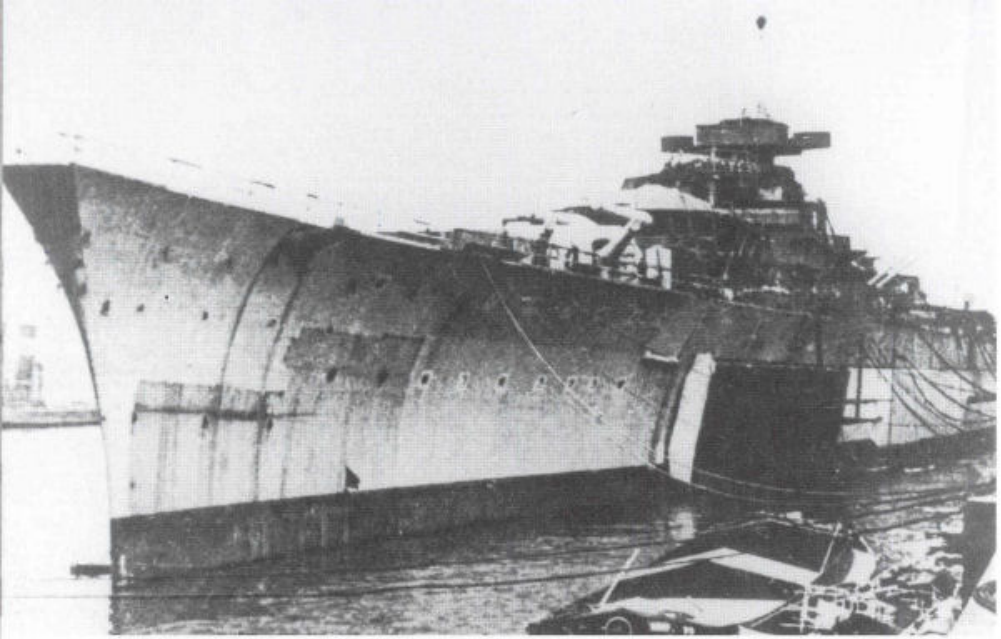
Compared to contemporary battleships, the BISMARCKs were consistently in the middle of the pack. Their 38 CM main armament was larger than the 35.6 CM (14-inch) guns on the British KING GEORGE Vs, but smaller than the 46 CM (18.1-inch) guns of the YAMATOs or the 40.6 CM (16-inch) guns of any of the US Navy's modern battleships. Similarly, their armor and speed was better than some and not as good as others. Like the DEUTSCHLANDs years earlier, the effect their existence had on Allied (particularly British) strategic thinking was far out of proportion to the actual threat they represented. With the conquest of Norway and France, the Germans had ports from which these ships could emerge that stretched from above the Arctic Circle to the Spanish border. To counter this threat, the Royal Navy tied up a large number of valuable ships in order to be ready for any move by the BISMARCKs. In any event, it



BISMARCK was launched at the Blohm & Voss (B&V) shipyard in Hamburg on 14 February 1939. This occurred as soon as her hull was complete and the basic structure installed up to the maindeck. It allowed the building slip to be freed for the next large ship. None of BISMARCK's superstructure, main battery turrets, or guns were installed at that time. She was launched with a straight stem common to early *Kriegsmarine* capital ships. (NHC)

The bulk of her construction occurred after launch at the fitting out basin. BISMARCK is seen at the B&V yard in December of 1939. The armor belt was being installed and D (*Dora*) turret looks complete with guns in place, but C (*Cäsar*) turret is without guns and surrounded by scaffolding. The tower foremast is partially complete; however, the funnel is not yet fitted. (NHC)





The new 'Atlantic' bow is mostly finished on BISMARCK at the B&V yard on 10 December 1939. This increased the ship's overall length by 3 M (9 feet 10.1 inches) and improved its handling in heavy seas. Individual belt armor plates were not yet fully welded into place. BISMARCK's A (*Anton*) turret is finished and rotated. The B (*Berta*) turret has its guns, but scaffolding wrapped around it indicated continued work in progress. (NHC)

BISMARCK's construction at Hamburg proceeded through the hard winter of 1939-40. Work on B (*Berta*) turret was basically complete in early 1940, while the tower foremast was completed several levels higher than in the previous December. Each 38 CM (15-inch) SK C/34 gun had a maximum range of 19.85 nautical miles (22.9 miles/36.8 KM). (*Bundesarchiv*)

turned out that British airpower made it impossible to hide the movement of these ships and eventually was instrumental in their destruction. For a few days in May of 1941, after sinking the battlecruiser HMS HOOD and before her own demise, BISMARCK seemed to be the dreaded sea monster that German propaganda and British fears made her out to be. After that, the surviving TIRPITZ and the rest of the German capital ships had little effect on the war. By war's end, all seven of these ships rested on the bottom.

BISMARCK, as launched, was 240.2 M (788 feet 0.7 inches) long at the waterline, 248 M (813 feet 7.8 inches) overall, a beam of 36 M (118 feet 1.3 inches), and a draft of 8.7 M (28 feet 6.5 inches) at standard displacement and 10.2 M (33 feet 5.6 inches) at full load. The somewhat heavier TIRPITZ had a deeper draft of 9 M (29 feet 6.3 inches) at standard displacement and 10.6 M (34 feet 9.3 inches) at full load. Both ships were fitted with a new, more curved bow prior to entry into service, which increased waterline length to 241.5 M (792 feet 3.9 inches) and overall length to 251 M (823 feet 5.9 inches). BISMARCK's full load displacement at the time of her one operation was 50,900 tons; TIRPITZ's displacement during the war was approximately 52,600 tons.

The BISMARCKs were each fitted with 12 high-pressure oil-fired Wagner boilers and three sets of geared turbines driving three screws. Blohm & Voss manufactured BISMARCK's turbines, while Brown-Boveri produced TIRPITZ's. This machinery gave a design output of 138,000 SHP and a maximum speed of 29 knots (33 MPH/54 KMH). BISMARCK's range was 9280 NM (10,686 miles/17,197 KM) at 16 knots (18 MPH/30 KMH). TIRPITZ had greater fuel storage, which gave her a range of 10,200 NM (11,745 miles/18,902 KM) at the same speed.

Both ships had belt armor with a maximum thickness of 320MM (12.6 inches). They also had a 45MM (1.8-inch) thick inner torpedo bulkhead, which ran from the armored deck down to the inner bottom. The main armored deck was 80MM (3.1 inches) thick, with an extension of 100MM (3.9 inches) thickness angling down to the bottom of the side armor. They also had a thin 30MM (1.2-inch) bulkhead from the armored deck up to the 50MM (2-inch) thick armored main deck.

The complements of these ships varied during the war, from a low of 2092 for BISMARCK during its Atlantic sortie to a maximum of 2608 for TIRPITZ with her vastly expanded Anti-Aircraft (AA) armament.

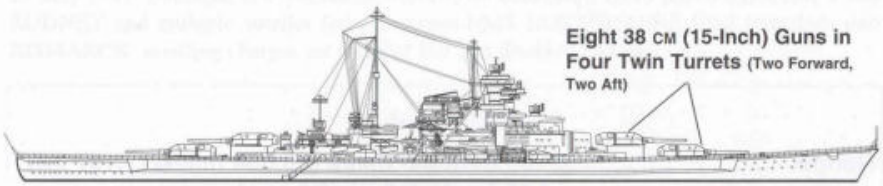
The BISMARCKs' main battery consisted of eight 38 CM (15-inch) SK C/34 naval rifles. These were mounted in four twin-turrets, two forward and two aft. This gun was a new design dating from 1934 with significantly better performance than the World War One-vintage 15-inch gun used in the late-war BAYERN Class. The barrel had a length of 47 calibers, or 1786 CM (703.1 inches). The SK C/34 fired 798 KG (1759-pound) shells at 820 M (2690 feet) per second to a maximum range of 19.85 NM (22.9 miles/36.8 KM) at a rate of three rounds/minute. (This range was less than that obtained by the 28 CM [11-inch] guns on the DEUTSCHLANDs and SCHARNHORSTs. This was due to the larger gun firing a far heavier shell at a lower muzzle velocity and a lower angle.) The secondary battery was twelve 15 CM (5.9-inch) SK C/28 guns in six twin-turrets. At launch, the AA battery consisted of sixteen 10.5 CM (4.1-inch) SK C/33 guns in eight twin mounts, sixteen 3.7 CM SK C/30 cannon in twin mounts, and twelve 20MM *Flak* 38 cannon in single mounts. New 20MM mounts were added to TIRPITZ as the war progressed, reaching a maximum of 16 *Flakvierling* 38 quad mounts plus many single mounts.

Both ships were launched without torpedo armament, but TIRPITZ carried eight 53.3 CM (21-inch) torpedo tubes in quadruple mounts on the main deck from 1942. The tubes had been originally mounted on *Kriegsmarine* destroyers sunk at Narvik, Norway in 1940. These tubes were loaded with standard G7a steam-driven torpedoes as used in the DEUTSCHLANDs.

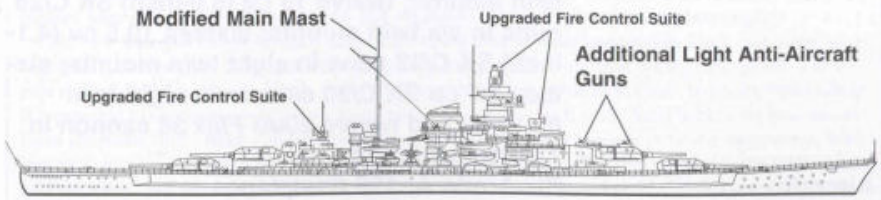
The BISMARCKs carried five 10.5 M (34-foot 5.4-inch) optical rangefinders for main battery fire control. One each was located atop the fore and aft superstructures and one each mounted in three of the four main turrets. (The foremost, *Anton*, turret on BISMARCK was originally fitted with a rangefinder, but this was removed during the winter of 1940-41 when it was found to be repeatedly damaged by wash over the bow at high speeds. The same change was also made to TIRPITZ.) These ships also mounted a smaller 7 M (22-foot 11.6-inch) optical rangefinder atop the conning tower for use if the larger rangefinders became unavailable. Both BISMARCKs entered service equipped with search radar, an FuMO 23 fitted to the rangefinders on the foremast, after mast, and conning tower. (The FuMO 23 was similar to the earlier FuMO 22 ,but had increased power for increased bearing accuracy.) This radar used a mattress-type antenna 2 M (6 feet 6.7 inches) high by 4 M (13 feet 1.5 inches) wide. BISMARCK sank with this fit; TIRPITZ had her radar suite upgraded regularly as the war progressed. She was fitted with an FuMO 27 set on her forward main rangefinder in Norway in January of 1942, in the place of the FuMO 23, but with the same antenna. A small radar shack was added on top of the rangefinder station. The front of this post mounted a *Timor* (FuMB *Ant* 7) antenna, serving what was most likely an FuMB 4 radar detector. Small, single-dipole *Sumatra* (FuMB *Ant* 4) antennas were fitted at the other three cardinal points around this radar shack. A twin-dipole *Palau* (FuMB *Ant* 6) antenna was mounted on a pole above this station sometime after this, but before the next major upgrade in 1944. Simultaneously, the two antennas facing forward on the foremast were replaced by a single 3 M (9-foot 10.1-inch) by 4 M mattress-type antenna for an FuMO 26 radar, a further improvement in the FuMO 22 series.

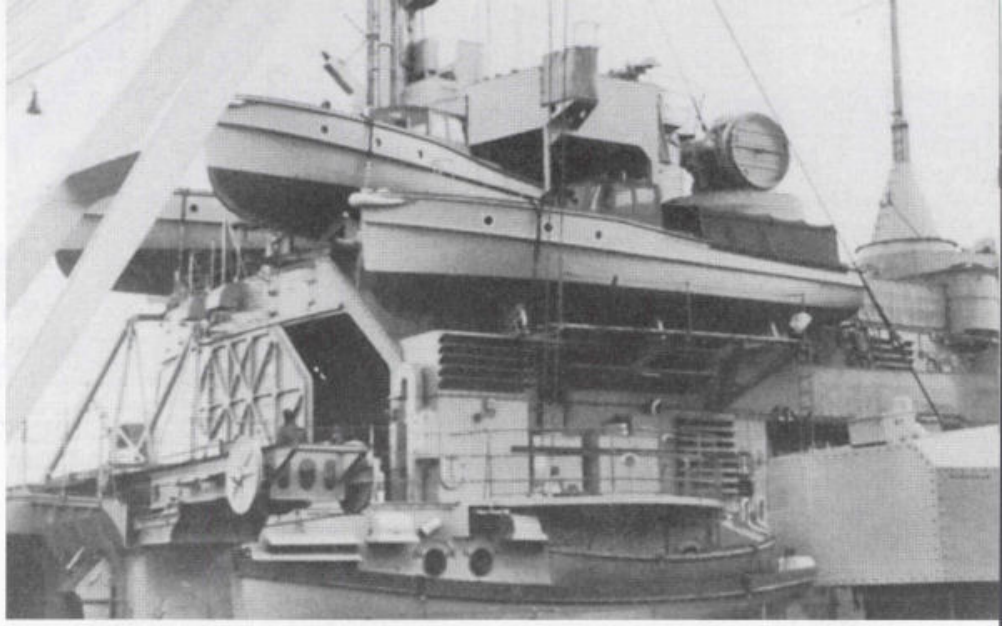
In mid-1944, the aftmost (No. 3) anti-aircraft director was experimentally fitted with a *Luftwaffe*-developed fire-control radar in the *Würzburg* series (either FuMO 212 or FuMO 213). This had a 3 M diameter circular, parabolic antenna.

BISMARCK, 1941



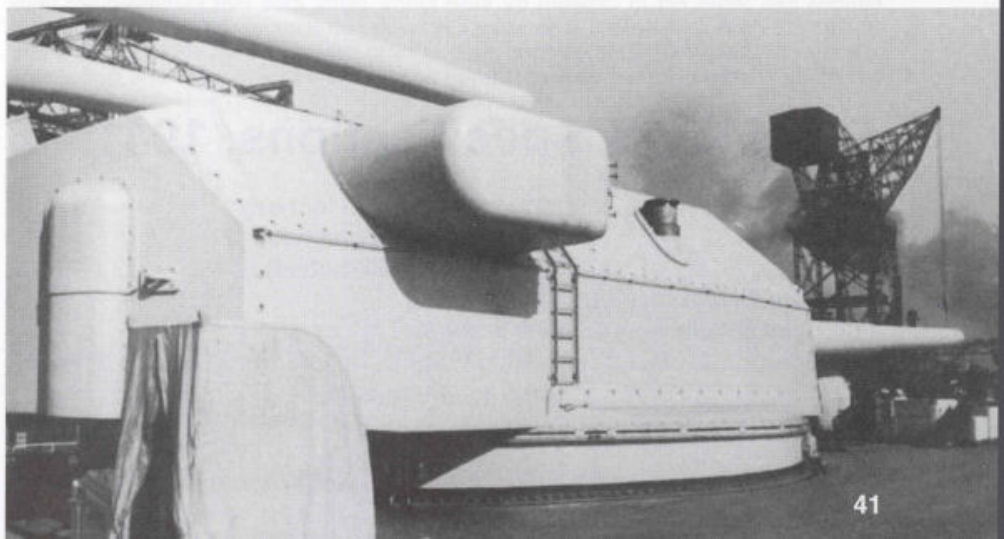
TIRPITZ, 1944

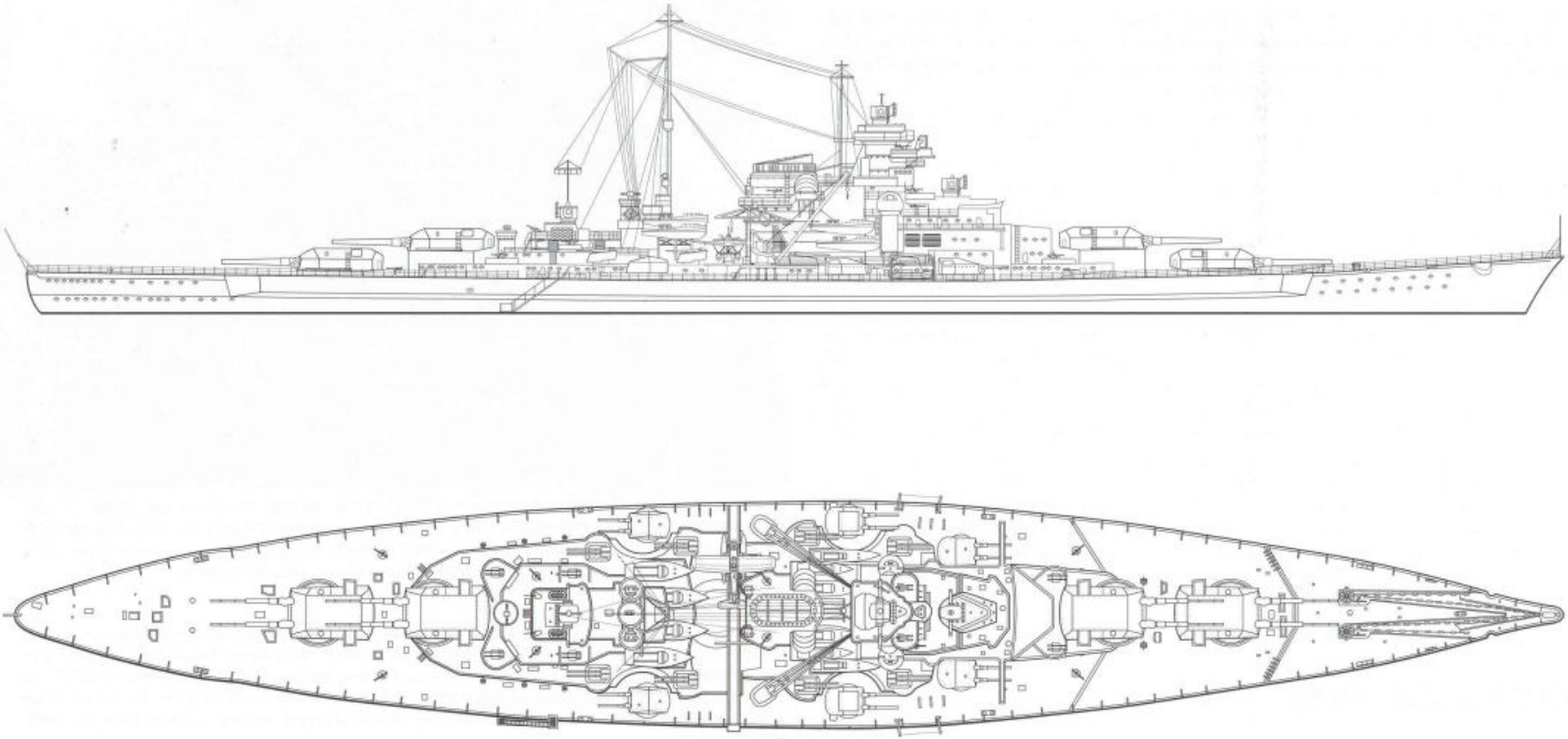




Motor barges are stowed amidships on BISMARCK, beside the mainmast base. These vessels moved personnel between this ship and the shore or other vessels. The aircraft catapult is located immediately ahead of the hangar, whose door is partially open. BISMARCK embarked up to six Arado Ar 196A floatplanes. (*Bundesarchiv*)

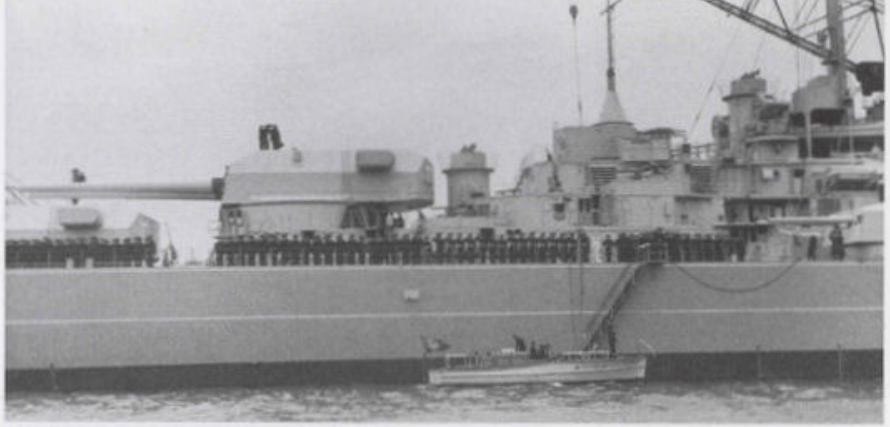
A (*Anton*) turret is freshly painted on BISMARCK in 1940. Both 38 CM (15-inch) guns in each main turret had an elevation range of +30° to -5.5°. This turret had hoods for the optical rangefinder on both the port and starboard sides; however, the rangefinder and hoods were removed after her trials in 1940-41. Rangefinders were retained on the other three main turrets. Guns from the B (*Berta*) turret project above *Anton* turret's roof. (*Bundesarchiv*)





BISMARCK Specifications, 1941

Overall Length: .....251 M (823 feet 5.9 inches)
Beam: .....36 M (118 feet 1.3 inches)
Draft:.....8.7 M (28 feet 6.5 inches)
Standard Displacement: ..41,700 tons
Full Load Displacement:..50,900 tons
Machinery: .....Twelve Wagner boilers, three Blohm & Voss turbines, three screws
Speed: .....29 knots (33 MPH/54 KMH)
Range: .....9280 nautical miles (10,686 miles/17,197 KM) at 16 knots (18 MPH/30 KMH)
Complement: 2092
Armament: .....Eight 38 CM (15-inch) SK C/34 guns in four twin mounts; twelve 15 CM (5.9-inch) SK C/28 guns in six twin mounts; sixteen 10.5 CM (4.1-inch) SK C/33 guns in eight twin mounts; sixteen 3.7 CM SK C/30 cannon in eight twin mounts; and twelve 20MM *Flak* 38 cannon in 12 single mounts.
Aircraft: .....Six Arado Ar 196 floatplanes



A full crew was aboard when BISMARCK was commissioned into the *Kriegsmarine* on 24 August 1940. By this time, she had been underway several times for her pre-commissioning Builder's Trials. These allowed Blohm & Voss to test essential ship's systems and certify their operation before handing the ship over to the navy. The *Kriegsmarine* worked up the crew and ship together for several months after commissioning. (*Bundesarchiv*)

BISMARCK Class Battle Histories:

BISMARCK:

18 May 1941: Left Gotenhafen (now Gdynia, Poland) with heavy cruiser PRINZ EUGEN for Operation RHEINÜBUNG (RHINE EXERCISE), breakout into the Atlantic.

24 May 1941: Sank British battlecruiser HMS HOOD and damaged British battleship HMS PRINCE OF WALES in Denmark Strait; hit by three shells, one of which punctured forward oil storage tank; loss of oil and failure to refuel at Korsfjord (Bergen) forced decision to steer for French coast; attacked by nine aircraft from British carrier HMS VICTORIOUS; one minor hit.

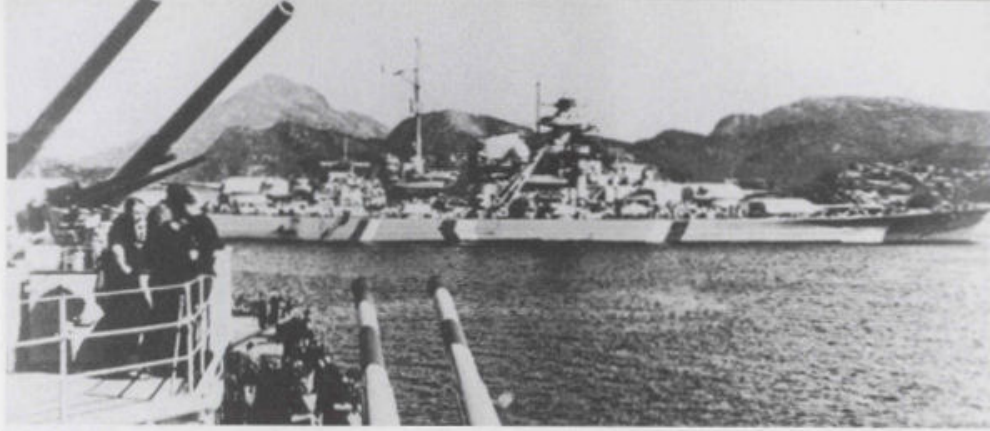
26 May 1941: Hit by one torpedo from a Swordfish from British carrier HMS ARK ROYAL; steering gear disabled.

27 May 1941: Damaged in engagement with British battleships HMS KING GEORGE V and RODNEY and multiple smaller forces; cruiser HMS DORSETSHIRE fired torpedoes into BISMARCK; scuttling charges set off after last gun disabled and ship sank.

Author's Note:

There is understandable confusion over the color of BISMARCK's turret tops during her working up period in the Baltic Sea in 1941. It is established that the *Kriegsmarine* used various turret top colors – Red, Yellow, and Light Blue have been documented – as air recognition markings during World War Two. Color photographs in German wartime publications show BISMARCK and other ships with the Red turret tops and Black and White hull bands used in the Baltic, but there is no certainty that these images were original color photography and not hand-colored black and white photographs.

The best case for BISMARCK's turret tops being Red is from interpreting black and white photographs. The Germans used both orthochromatic and panchromatic film during this period. The former renders Red the same as Black, while the latter shows it as a Medium Gray. In photographs where it is possible to simultaneously see an item known to be Red – such as the band behind the bow swastika or the battle flag's field – and the turret tops, these items mostly appear to be the same color. With that said, it is impossible to be totally certain of the color. It is possible that the turret tops were painted Dark Gray, but this author finds this unlikely for the reasons stated and because Dark Gray would be a poor choice as an air recognition color.



BISMARCK is underway astern of the heavy cruiser PRINZ EUGEN in the Baltic during the early Spring of 1941. The battleship is painted in the *Kriegsmarine*'s 'standard' Baltic scheme of Light Gray, with Dark Gray bow and stern and White false bow waves fore and aft. Additionally, Black and White bands were painted over the hull and superstructure. Main turret tops were later painted *Deckfarbe Rot* (Deck Color Red). (NHC)

TIRPITZ:

November 1941: Breakout into Atlantic w/ADMIRAL SCHEER cancelled on Hitler's orders.

January 1942: Transferred to Altafjord, Norway.

6-12 March 1942: Operations against Allied Convoys PQ.12 & QP.8; unsuccessful due to poor weather.

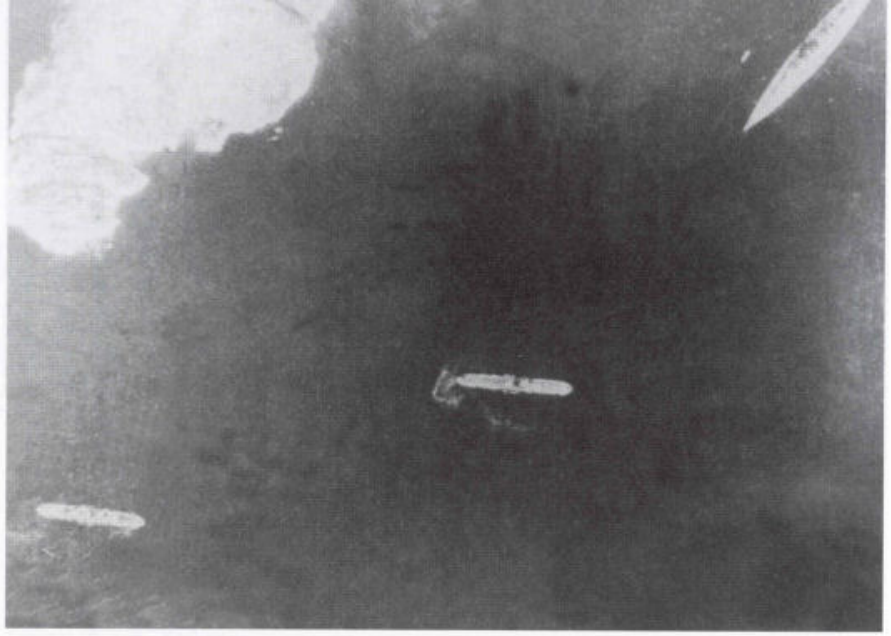
5 July 1942: Operation RÖSSELSPRUNG against Convoy PQ.17 cancelled.

6-9 September 1943: Operation SIZILIEN against Spitzbergen w/SCHARNHORST; shelled Barentsburg.

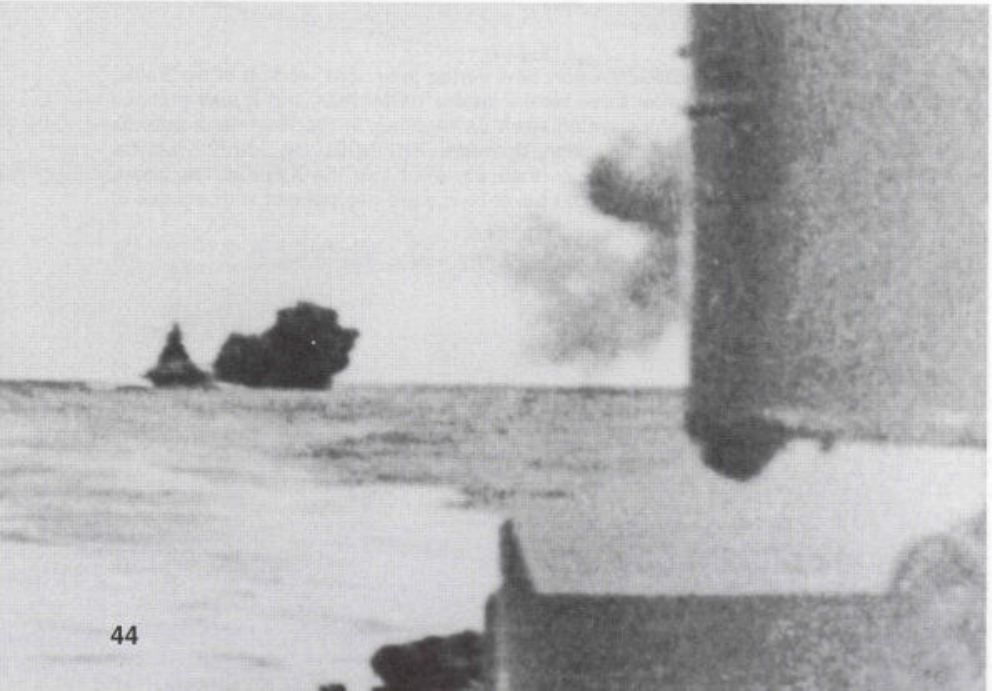
22 September 1943: Attacked by X-craft (RN midget submarines) in Altafjord; damaged by mines planted by HMS X6 & X7.

BISMARCK cruises off PRINZ EUGEN's port bow during their 1941 workup in the Baltic. PRINZ EUGEN was commissioned three weeks before BISMARCK and it was planned from the beginning that both ships would work up together in the Baltic and operate together in the Atlantic on their first mission, Operation RHEINÜBUNG. Both BISMARCK and PRINZ EUGEN were repainted prior to their breakout into the Atlantic. The bows, sterns, hull and superstructure bands, and turret tops were overpainted with shades of Gray. (NHC)

Crewmen aboard PRINZ EUGEN pass a light line to BISMARCK prior to sending either a fuel line or a tow line to the battleship. This maneuver was practiced in the Baltic prior to RHEINÜBUNG. Passing lines at sea was performed in case either ship became disabled or lost fuel during their planned sortie. *Admiral* Günther Lütjens commanded RHEINÜBUNG from aboard BISMARCK. (NHC)

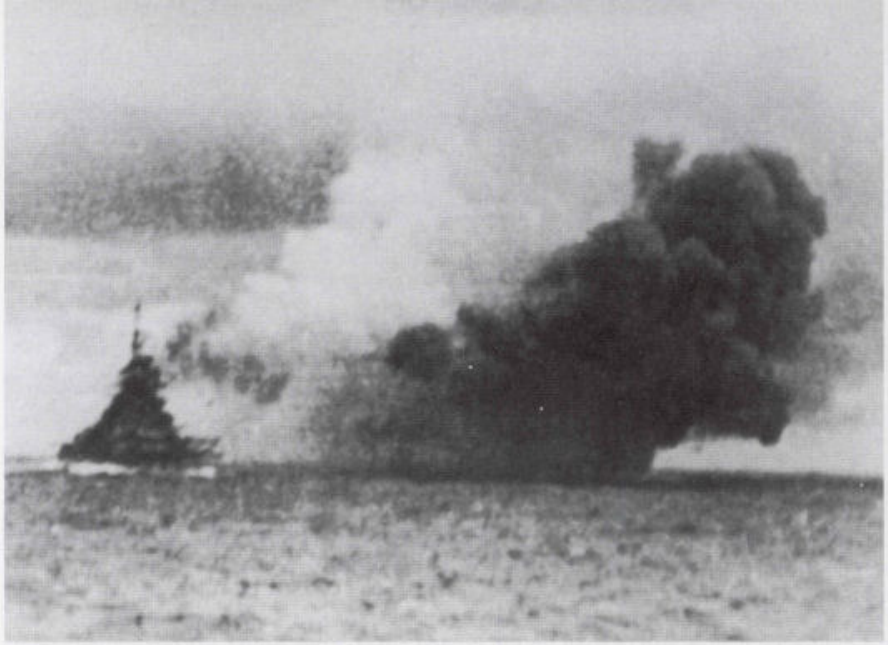


The British kept a careful watch for BISMARCK's anticipated breakout during the Spring of 1941. An RAF reconnaissance aircraft caught BISMARCK (upper right) and two supply ships in Korsfjord harbor near Bergen, Norway on 21 May. This was one day after a Swedish cruiser spotted BISMARCK and PRINZ EUGEN passing through the Kattegat. *Admiral* Lütjens opted to leave Korsfjord the evening of 21-22 May, although only PRINZ EUGEN had been able to refuel. (NHC)



September 1943-March 1944: Under repair.
3 April 1944: Attack by a/c from six RN aircraft carriers; 14 hits; remains seaworthy.
5 April 1944: Attacked again by RN a/c; no further damage.
17 July 1944: Attacked again by RN a/c; no further damage.
22-29 August 1944: Repeated attacks by RN a/c; two bomb hits on 24 August; remains seaworthy.
15 September 1944: 28 RAF Lancaster bombers drop 6-ton (5.4 MT) bombs; one near miss to bow, causing extensive damage; ship temporarily unseaworthy.
17 October 1944: Transferred to Tromsö, Norway for use as floating battery.

BISMARCK has just opened fire on the British battlecruiser HMS HOOD soon after dawn on 24 May 1941. The German battleship was astern and to starboard of PRINZ EUGEN. Both BISMARCK and PRINZ EUGEN departed Korsfjord the night of 21-22 May without being spotted and the RAF did not confirm their absence until daytime on 22 May. The Royal Navy responded by dispatching HOOD and the battleship HMS PRINCE OF WALES with six destroyers from Scapa Flow in the Orkney Islands. They headed northwest to cover the exits into the Atlantic between the Orkneys and the coast of Greenland. All available British warships were brought up from Gibraltar and the Atlantic convoy routes. A British cruiser patrol in the Denmark Strait spotted the German ships on the evening of 23 May and shadowed them by radar through the night as HOOD and PRINCE OF WALES came up from the southeast. The two forces met west of Iceland soon after dawn on 24 May. (NHC)

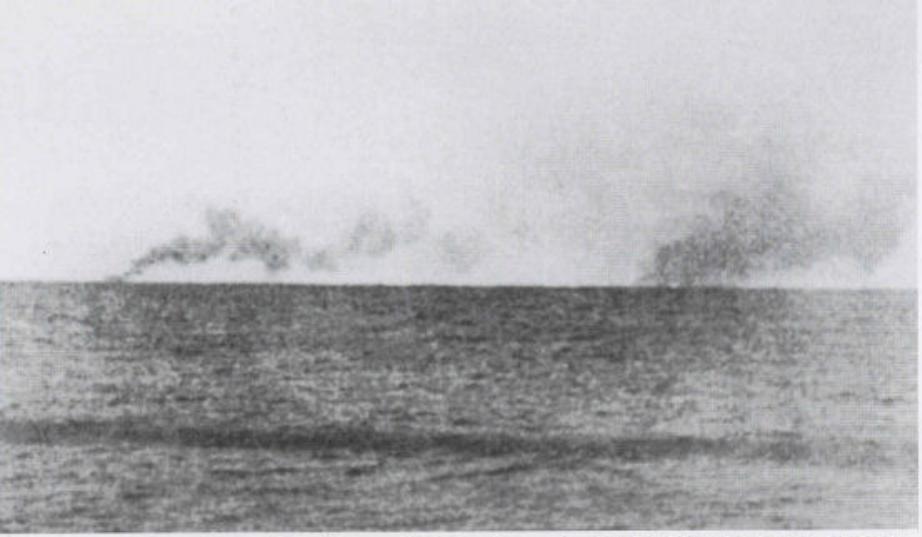


BISMARCK's 38 cm (15-inch) main guns fire a salvo at HOOD early in the Battle of the Denmark Strait on 24 May 1941. This engagement began at 0552 hours with HOOD and PRINCE OF WALES firing on PRINZ EUGEN and BISMARCK at a range of 22 km (13.7 miles). Three minutes later, the German ships opened up at a range of 21 km (13 miles). (NHC)

The British ships closed quickly, because PRINCE OF WALES' 35.6 cm (14-inch) guns had less range than either HOOD's or BISMARCK's 38 cm weapons. Additionally, this maneuver attempted to reduce HOOD's risk from plunging long-range fire. Both German ships turned slightly away when the range dropped to 14 km (8.7 miles) and HOOD had already obtained two hits on BISMARCK. (NHC)

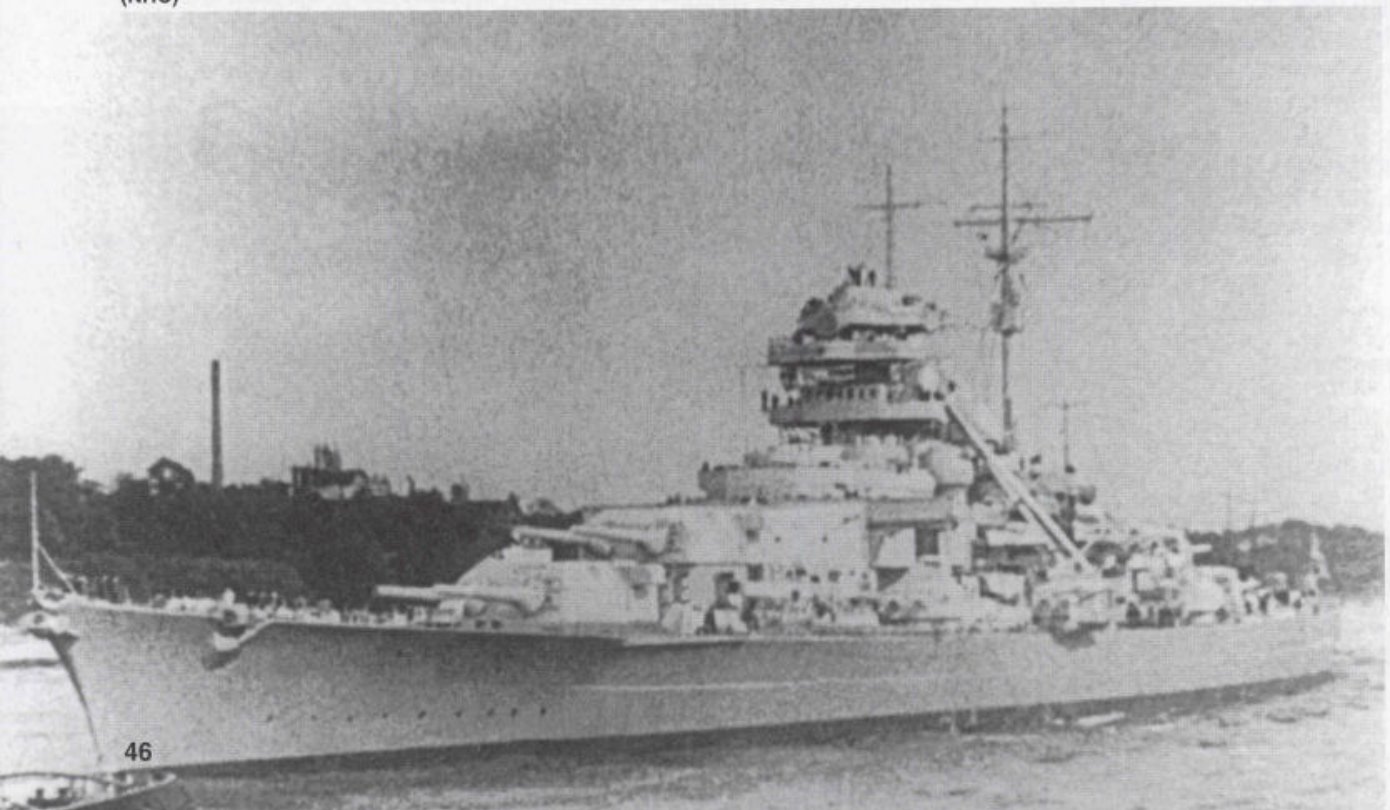
29 October 1944: Unsuccessful attack by 32 Lancasters.
12 November 1944: Attacked by 21 Lancasters; hit three times; capsized.

The Germans' turning maneuver put the British ships on the Germans' port quarter, with BISMARCK just aft of PRINZ EUGEN's starboard beam. BISMARCK's C (*Cäsar*) and D (*Dora*) turrets fired a semi-salvo from 15.5 km (9.6 miles) at 0600 hours. This was her second salvo and was the one that sank HOOD. Shell splashes to starboard were from HOOD, which was being hit at approximately this instant. One of BISMARCK's 38 cm shells struck HOOD's aft hull. This shell ignited an Unrotated Projectile (UP; rocket) storage locker and fires then reached her aft magazine. HOOD's aft magazine exploded, which caused a chain reaction that broke the battlecruiser in half. HOOD sank within three minutes, with only three survivors from her complement of approximately 1400 officers and men. (NHC)



BISMARCK switched her main battery towards PRINCE OF WALES after HOOD – whose smoking remains are at right – sank from a German salvo. PRINCE OF WALES was hit at least four times in rapid succession and she disengaged from the battle by 0610 hours. Smoke from damage to PRINCE OF WALES is seen to the left in this view from PRINZ EUGEN, which was northwest of the British ships. (NHC)

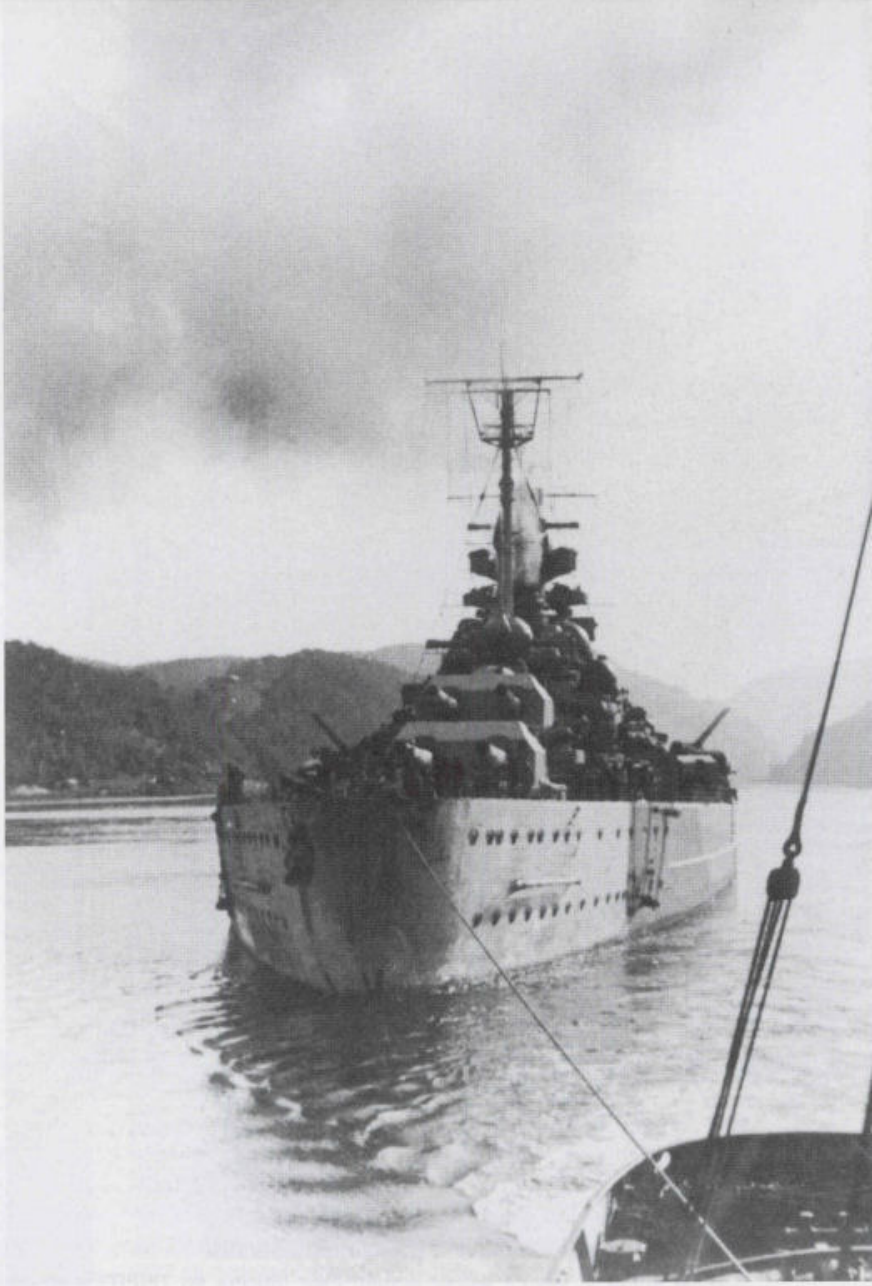
A seaman on PRINZ EUGEN took this final clear image of BISMARCK soon after the Battle of the Denmark Strait. She is losing fuel from a hole at the waterline forward, due to a hit from PRINCE OF WALES, and is noticeably down at the head. BISMARCK turned a complete circle before settling on a southeast course and headed for the French coast, while PRINZ EUGEN turned southwest. This maneuver surprised the British, who lost contact with BISMARCK early on 25 May. An RAF Catalina sighted her the next day and a Swordfish's torpedo rendered her unmaneuverable. On 27 May 1941, the battleships HMS KING GEORGE V and RODNEY heavily damaged BISMARCK, which was finished off by torpedoes from the cruiser HMS DORSETSHIRE. BISMARCK's crew set off scuttling charges after her guns were silenced. These and the British projectiles finally sent BISMARCK to the bottom of the North Atlantic. (NHC)



TIRPITZ rests near Wilhelmshaven during her builder's trials in late 1940. Her hull was painted Medium Gray and superstructure Light Gray during this period. Her construction was between two and three months behind that of her sister BISMARCK. The forward main battery rangefinder has not yet been fitted atop her forward superstructure. TIRPITZ was commissioned on 25 February 1941. (NHC)

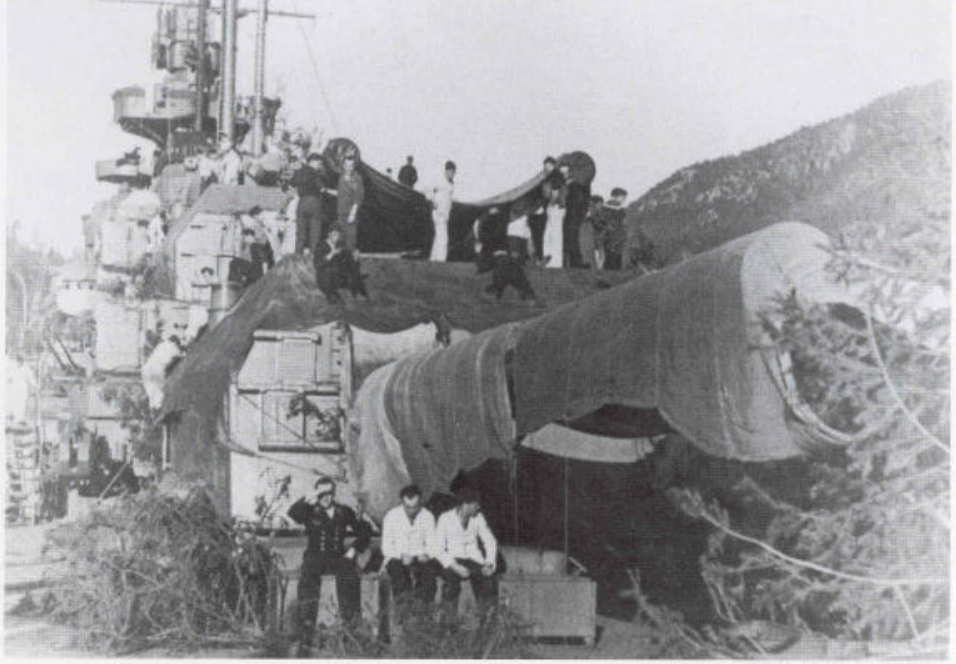
BISMARCK's loss scaled back plans to employ TIRPITZ for commerce raiding. The *Kriegsmarine* wanted to send her and ADMIRAL SCHEER out into the Atlantic in November of 1941, but Hitler personally cancelled the operation. Instead, TIRPITZ was transferred to Altafjord, Norway in January of 1942. She moves through Norwegian waters in a Light Gray and Dark Gray splinter camouflage during the Spring of 1943. (NHC)

The sinking of SCHARNHORST on 26 December 1943 made obvious the bleak future Germany's few surviving capital ships had against ever-increasing Allied forces. That condemned TIRPITZ to remain in harbor in northern Norway for the indefinite future. Royal Navy midget submarines (X-Craft) attacked TIRPITZ on 22 September 1943. This put her out of action for six months, necessitating repairs being made at Flehkefjord, Norway.



TIRPITZ displays her 36 M (118 foot 1.3 inch) beam at Flehkefjord in the Fall of 1943. A small harbor craft lies just astern of the battleship. The BISMARCK Class' wide beam added greatly to their renowned survivability. Both the British KING GEORGE V and the American IOWA Classes had beams at least 3 M (9 feet 10.1 inches) narrower than the BISMARCKs. (NHC)

A small group of sailors gather around their officers on TIRPITZ's aft deck in Flehkefjord. They stand under the two 38 cm (15-inch) guns of D (*Dora*) turret, which are swung to port. TIRPITZ had a maximum complement of 2608 officers and men, compared to 2092 for BISMARCK. Camouflage netting covers a repair raft tied up beside the battleship's port quarter. Similar rafts are located in the background.

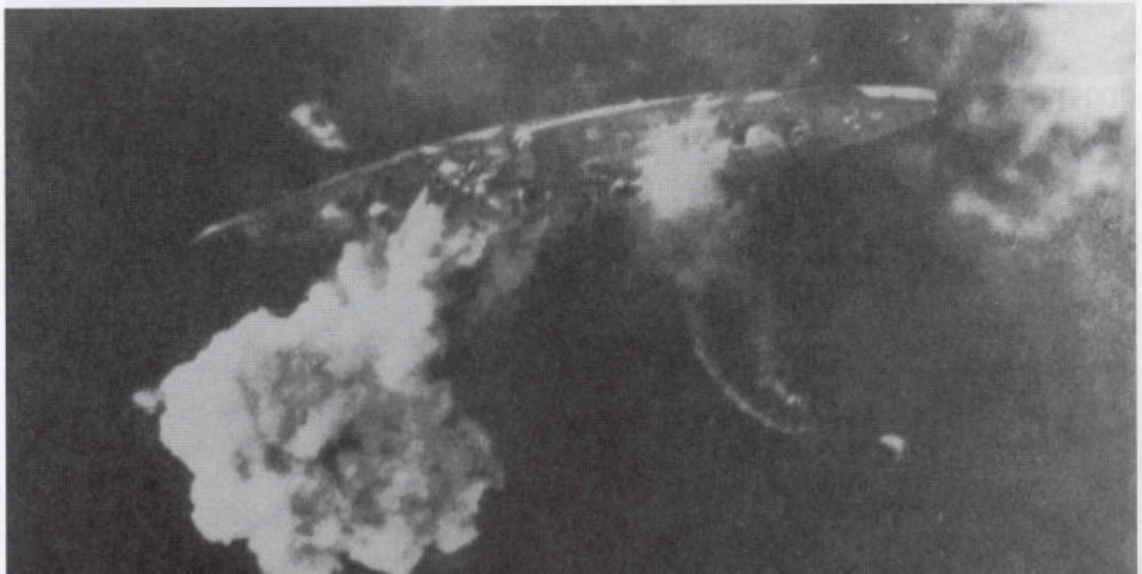


Cut pine trees are distributed around TIRPITZ's deck while she is moored at Flehkefjord. Canvas covers are draped over the C (*Cäsar*) and D (*Dora*) turrets and guns. The longer she remained idle, the more elaborate the array of items intended to camouflage the ship.

Several crewmen relax in the sun while a pair of officers stroll TIRPITZ's deck in the Spring of 1944. Pine boughs were liberally strewn around the ship in an attempt to break up her regular lines. (NHC)

By April of 1944, British naval airpower was well within striking range of TIRPITZ at her regular base at Altafjord. The Germans decided to improve her safety by regularly moving her among Norway's thousands of fjords. TIRPITZ is docked at Faettenfjord, near Trondheim. Canvas covers were draped over her main battery gun barrels. Lines of buoys suspended nets designed to protect TIRPITZ against X-Craft and air-dropped torpedoes.

TIRPITZ reels from a British air attack at Kaafjord, Norway on 15 September 1944. RAF Avro Lancasters flew from airfields near Murmansk, the Soviet Union and dropped 6-ton (5.4 MT) 'Tallboy' bombs on the battleship. This attack sufficiently damaged TIRPITZ that she was no longer seaworthy. The Germans towed her south to Tromsö, where she was hit three times by 'Tallboys' and capsized on 12 November 1944.



An RAF reconnaissance aircraft took this photograph of TIRPITZ sometime in early to mid-1944. The main deck was camouflaged with large dark spots of paint over the lighter natural wood background. Reflected sunlight made the forecastle and fantail stand out, despite this camouflage. Carrier-based Royal Navy aircraft made several attacks on TIRPITZ between 3 April and 29 August 1944.

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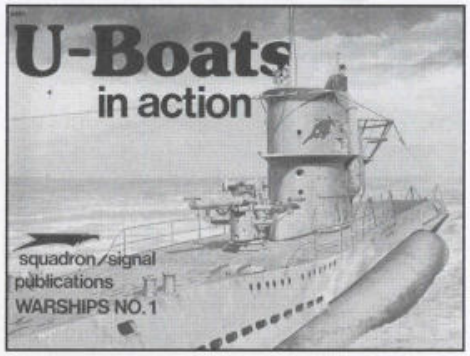

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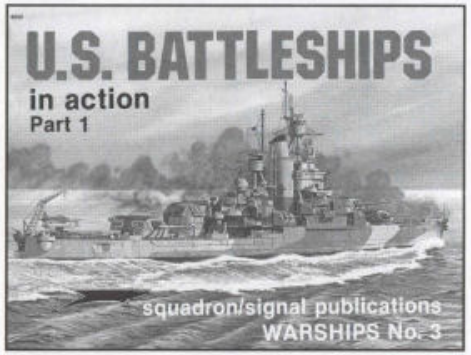
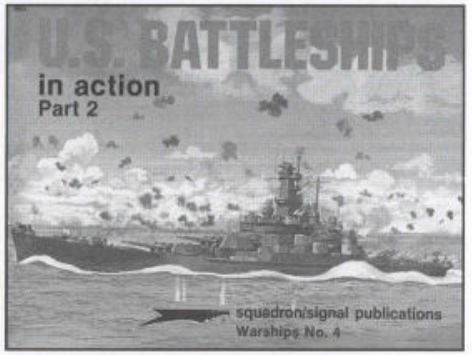


4003 US Battleships, Part 1



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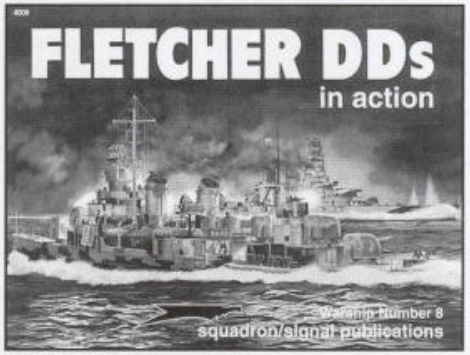
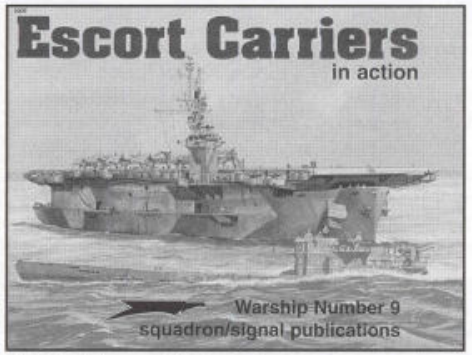


4008 Fletcher DDs



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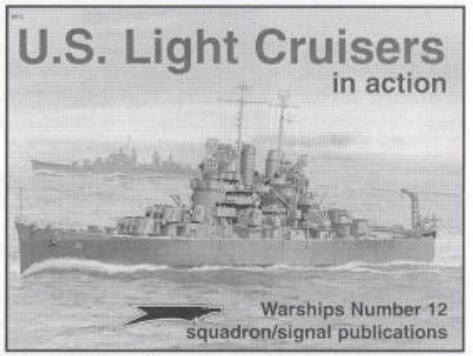

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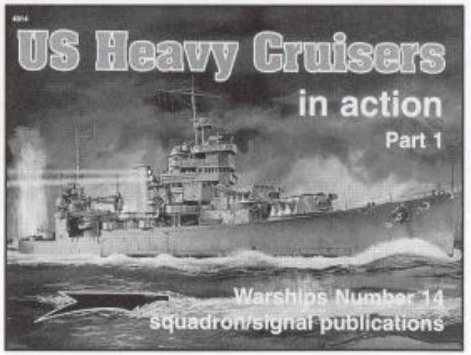
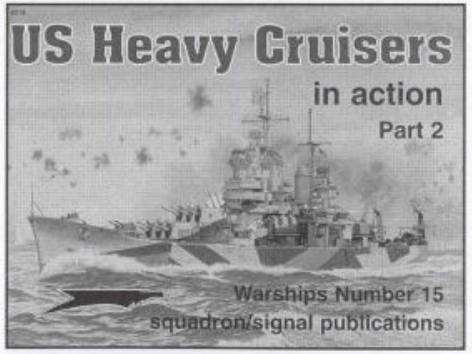


4014 US Heavy Cruisers, Pt 1



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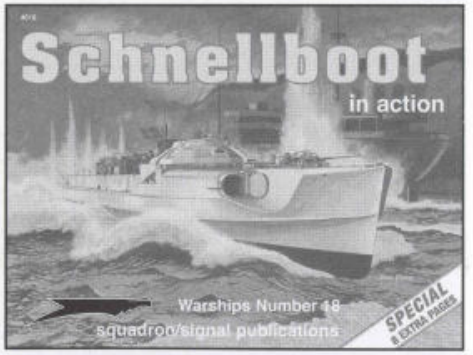

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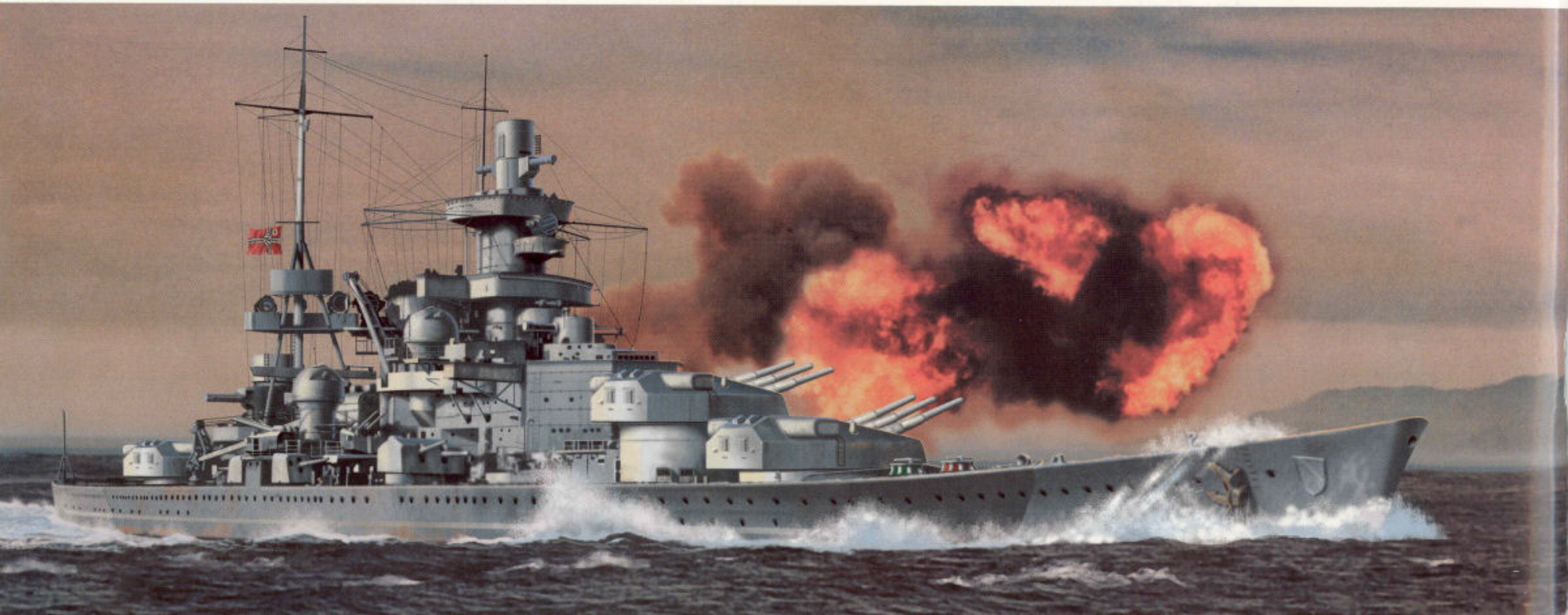
(Above) The *Panzerschiff* (Armored Ship) ADMIRAL GRAF SPEE cruises in the south Atlantic at the beginning of December of 1939. Her crew built a false gun turret ahead of the bridge and a false funnel aft. These false structures were removed prior to her engagement with three British cruisers on 13 December, GRAF SPEE was scuttled near Montevideo, Uruguay harbor four days later.

(Below) The battleship SCHARNHORST shells Allied positions on Spitzburgen during Operation SIZILIEN (SICILY) on 6-9 September 1943. She also landed German troops on the Norwegian island located in the Barents Sea. SCHARNHORST returned to Altafjord, Norway after this mission.